COMPARISON OF OUTCOMES OF MONOPOLAR TRANSURETHRAL RESECTION VS SALINE TRANSURETHRAL RESECTION (BIPOLAR) OF PROSTATE IN PATIENTS WITH BENIGN PROSTATIC HYPERTROPHY

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DECLARATION

I solemnly declare that this dissertation titled " **COMPARISON OF OUTCOMES OF MONOPOLAR TRANSURETHRAL RESECTION VS SALINE TRANSURETHRAL RESECTION (BIPOLAR) OF PROSTATE IN PATIENTS WITH BENIGN PROSTATIC HYPERTROPHY"** was prepared by me in the Department of Urology, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai under the guidance and able supervision of Prof. R. Jeyaraman MS, M.Ch., Professor & Head of the Department, Department of Urology, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai. This dissertation is submitted to the Tamil Nadu Dr. MGR Medical University, Chennai in partial fulfilment of the university requirements for the award of the degree of M.Ch. Urology.

Place: Chennai

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CERTIFICATE

This is to certify that the dissertation titled "**COMPARISON OF OUTCOMES OF MONOPOLAR TRANSURETHRAL RESECTION VS SALINE TRANSURETHRAL RESECTION (BIPOLAR) OF PROSTATE IN PATIENTS WITH BENIGN PROSTATIC HYPERTROPHY**" submitted by Dr.Kanagasabapathi M. appearing for M.Ch. (Urology) degree examination in August 2013, is a bonafide record of work done by him under my guidance and supervision in partial fulfilment of requirement of the Tamil Nadu Dr.M.G.R.Medical University, Chennai. I forward this to the Tamil Nadu Dr.M.G.R.Medical University, Chennai.

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INTRODUCTION

Prostate is one of the major accessory sex gland of male reproductive system. The prostate is a pyramidal shaped organ made up of fibro muscular and glandular tissue and it surrounds the prostatic urethra from the base of the bladder to the membranous part of urethra. The prostate was initially divided into five anatomical lobes. Now it is recognized that five lobes only distinguished in fetal gland before the 20 weeks' of gestation. In normal adult male only three lobes are recognizable which includes two lateral lobes which can be easily palpated via the rectum and a median lobe which when enlarges can be well identified by ultrasound (USG) and other imaging modalities.

Prostate has exocrine functions. But its role as endocrine organ is not fully established. Prostate secretes about 0.5 ml of the total seminal fluid which accounts for about one sixth of the seminal fluid. Multiple secretory protein products have been identified from the prostatic fluids. Important among these products are prostate specific antigen also known as PSA and acid phosphatase. These two products are useful in patients with cancer prostate.

As the age increases prostate continue to enlarge under the influence of dihydrotestosterone and testosterone. Enlargement of the organ can lead to

bladder neck obstruction which produces variety of lower urinary tract symptoms.

Benign prostatic hyperplasia (BPH) is one of the most common problems of aging males all over the world. Benign prostatic hyperplasia produces variety of lower urinary tract symptoms (LUTS) which can lead to simple disturbances in work to severe restriction of day today activities leading to poor quality of life.

The exact prevalence and incidence of BPH cannot be quantified because of BPH is an age dependent illness. The development of BPH starts as early as 40 years of age. BPH prevalence is greater than 50% by the age of 60 years and by the age of 85years BPH prevalence is as high as 90%.[1] As the age increases, bothersome symptoms also tends to increase with age.

Prostate enlargement in old age was described by various names which include benign prostatic hyperplasia (BPH), benign prostatic enlargement (BPE), or benign prostatic obstruction (BPO), benign prostatic hypertrophy, etc. Enlargement produce wide variety of symptoms which are known as lower urinary tract symptoms (LUTS) and they can classified as obstructive and irritative. Previously they were named as voiding and storage symptoms respectively. It includes hesitancy, thin stream, intermittency, post void

dribble, decreased force of urination, straining, nocturia, frequency and dysuria.

Prostatic enlargement is not the only cause for LUTS, also there are list of other conditions which may cause LUTS. Hence, the evaluation of patients with LUTS should go well beyond clinical evidence of enlarged prostate. It includes detailed history, clinical examination, per rectal examination followed by ultrasound, subjective assessment of symptoms in the form of various questionnaires and objective evidence of assessment of symptoms by uroflowmetry and invasive pressure flow studies.

Management of the patients diagnosed with enlarged prostate due to benign prostatic hyperplasia depends on symptomatology of the patient and objective assessment results. Treatment options available range from simple watchful waiting to open prostatectomy. In between the spectrum are medical management with alpha blockers or 5 alpha reductase inhibitors and various minimally invasive and endoscopic procedures like TURP, Transurethral needle ablation of prostate (TUNA), transurethral ultrasound–guided laser-induced prostatectomy (TULIP), transurethral vaporization of the prostate (TUVP), transurethral incision of prostate (TUIP). Surgical treatment provides sustainable long term results in the management of BPH. In the modern era of endoscopy the need for open procedure becomes less and less but still it has its own value in certain situations like large prostate more than 75 grams, BPH

with large bladder diverticulum, associated large vesical stone with enlarged prostate and conditions not allowing to place patient in lithotomy position like ankylosis of hip. Among the endoscopic options TURP is considered as a "gold standard" treatment for enlarged benign prostate and most commonly done surgical procedure for BPH. [25] Indications and treatment methods for enlarged prostate are well established. TURP can be done by using monopolar cautery or bipolar current. Monopolar is already established and gold standard procedure against which all other modalities are compared. Improvements in technology and modifications in instruments and various new advances in electrocautry have brought about huge reductions in morbidity and mortality, but the basic principles of TURP remain the same. Bipolar TURP is now increasingly done procedure for benign enlargement with an added advantage of reduced complications but it is not fully replaced the monopolar TURP and till date monopolar is considered as gold standard.

AIM AND OBJECTIVE

The primary aim and objective of the present study is to compare the clinical outcomes in terms of symptom improvement and early postoperative results after monopolar or saline resection TURP for benign prostatic hyperplasia and with a secondary objective to study the advantages of saline transurethral resection over monopolar transurethral resection.

REVIEW OF LITERATURE

Prostate is one of the major accessory sex gland of male reproductive system. It secretes about 0.5 ml of prostatic fluid which constitutes about one sixth of the total seminal secretion. Enlargement of the prostate occurs as the male becomes aged and produce lower urinary tract symptoms (LUTS). Medical and surgical treatments are available for the management of these symptoms. Minimally invasive and endoscopic procedures are mainstay in the treatment of this condition in which TURP is the 'gold standard' against which all other newer modalities are compared.

PROSTATE

EMBRYOLOGY OF PROSTATE;

Prostate develops during 10^{th} week of intrauterine life. It is a derivative of primitive endoderm. It develops from the caudal part of urogenital sinus from which the proliferation of epithelial buds occurs. This part is later invaded by the process known as "mesenchymal condensation". This condensation is androgen *independent process* which occurs in both males and females but epithelial budding is an androgen-*dependent process* and it is the first event in the development of prostate. Epithelial-mesenchymal interactions are very important for the development of prostate. Androgens presence alone not important for development but it should also present in sufficient quantity.

ANATOMY

Prostate is pyramid shaped gland located at the neck of the bladder and it surrounds the prostatic urethra. Prostate is fibro muscular gland and lies behind symphysis pubis. It measures about 3cm in length and 4cm in width and 2cm in depth. Prostate weighs about 14 to18gm in normal adult male but it weight increases as the age increases.

It has no true fibrous capsule. Prostate is enclosed by visceral fascia which contains the neurovascular tissue. This capsule is made up of collagen, elastin, and abundant smooth muscle and it is firmly adherent to gland and forms numerous fibro muscular septa which divide the prostate glands into indistinct lobules. It is attached to pubis by puboprostatic ligament anteriorly and urogenital diaphragm supports the inferior part. Prostate is traversed by urethra and posteriorly perforated by ejaculatory ducts, and it contains the prostatic utricle.

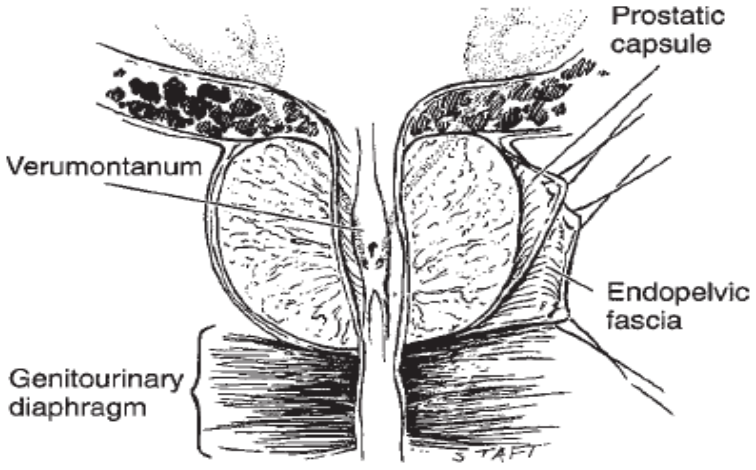


Figure 1. Cut Section of Prostate

Prostate is composed of 70% of glandular structures and remaining 30% composed of fibro muscular stroma. It is made up of tubuloalveolar gland type.

Lowsley classified the prostate into 5 lobes which are anterior lobe, posterior lobe and median lobe which project into bladder when it enlarged and right lateral and left lateral which are situated on both sides of the urethra. Franks divided the prostatic tissue with an inner (urethral) and outer glandular configuration. [2]

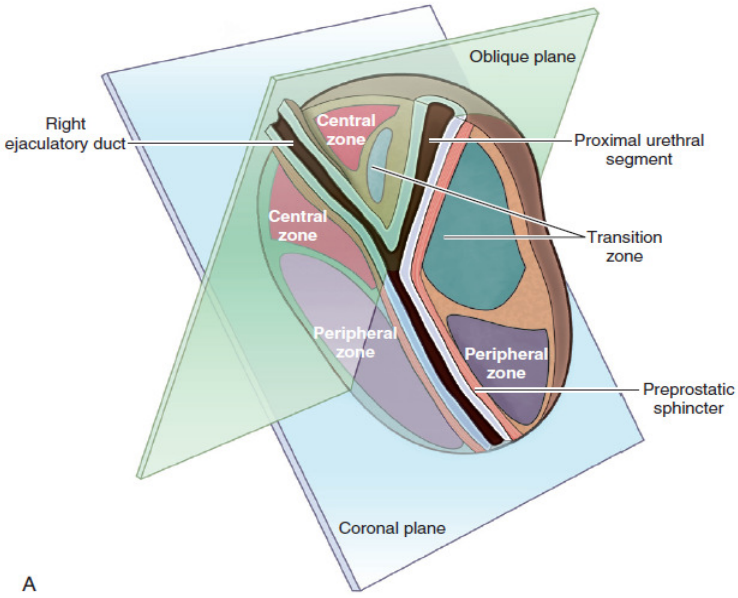


Figure 2. Zonal anatomy of prostate – coronal plane.

McNeal and Lowsley proposed that the inner urethral glands should be considered separately from the prostate and its intrinsic architecture.[3,4]

According to McNeal, the urethra separates the prostate tissue into ventral or anterior part (fibromuscular) and dorsal or posterior part (glandular). McNeal divided the glandular prostate into four regions: peripheral zone, central zone, transition zone, and periurethral gland region.

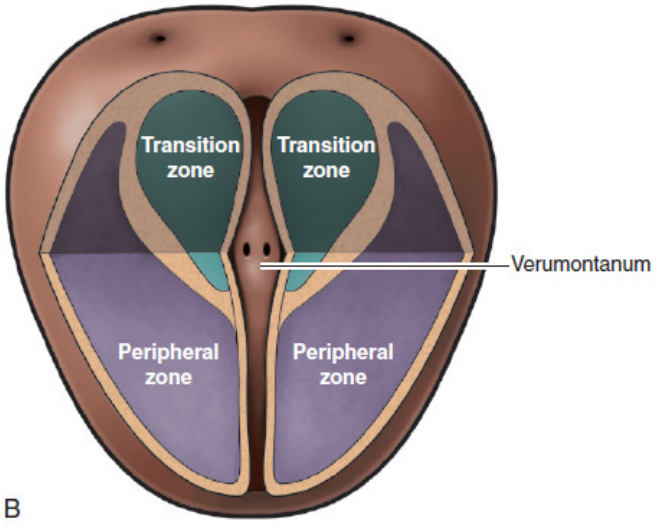


Figure 3.Zonal anatomy of prostate – sagittal plane.

BPH occurs in transitional zone and malignancy, inflammation of prostate develops from the peripheral zone. The central zone surrounds the ejaculatory duct and peripheral zone is cup-shaped and it encloses the central transitional zone and also the preprostatic urethra except anteriorly.

Prostate derives it blood supply through the inferior vesical, internal pudendal, and middle rectal arteries. Inferior vesical artery divides into urethral and capsular branches. Posteriorly at 5 and 7 o' clock position urethral branches enter the prostate at prostatovesical junction and anteriorly at 1 and

11 o'clock position. This landmark is important during TURP and open surgeries. Prostate is drained by peri prostatic plexus which further drains into deep dorsal vein of penis and internal iliac veins. Main lymphatic drainage is by internal iliac, sacral and obturator nodes.

BENIGN PROSTATIC HYPERPLASIA (BPH)

HISTORY

Urinary obstruction due to prostatic disease was described even in the olden days of medicine. The relationship between BPH and urinary obstruction initially proposed by Riolan as early as 17th century and further added by Morgagni in mid- 18th century. Morgagni proposed the one of the earliest descriptions of BPH [(5)]. Virchow identified the specific pathologic process in 19th century. Even after the understanding the pathologic process exact cause BPH remains elusive.

AETIOPATHOGENESIS

Benign Prostatic Hyperplasia is appropriately defined as "histological enlargement of the prostate gland from progressive hyperplasia of stromal and glandular prostatic cells". Such a hyperplasia usually begin in the part of urethra which is surrounded by prostate because increased number of glandular elements in the above mentioned area.

Growth of the tissue result from proliferation of the fibroblast or myofibroblast and epithelial glandular elements. Gland formation is usually occur only during gestational life. But this process of gland formation once again started in enlarging prostate gland is suggesting that reawakening of inductive potential which usually only seen during fetal development.[7]

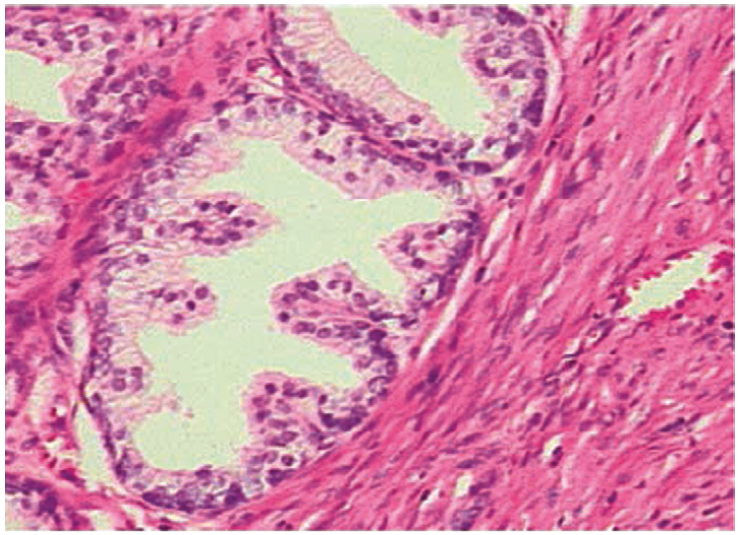


Figure 4. Stromoglandular hyperplasia(6)

Aetiology of this process is uncertain. The process of hyperplasia occurs in multifocal manner and it exhibits variegated histology mixed with different ratios of stromal nodular and glandular hyperplastic areas.[8]

Factors important in aetiology are,

1. Androgens,
2. Oestrogens,
3. Stromal-epithelial interactions,

4. Regulation of Programmed Cell Death
5. Growth Factors,
6. Neurotransmitters

HORMONAL FACTORS

Hormonal factors such as androgens and oestrogens are playing a role in enlargement of prostate**.** The development of prostate requires the presence of testicular androgens namely testosterone and dihydrotestosterone (DHT). Androgens are required not only for proliferation and differentiation but also for actively inhibiting the cell death**.** When BPH is produced experimentally by androgens, despite an increase in the size of gland, there is actually a decrease in the rate of DNA synthesis.[9] Enzyme 5α-reductase which is normally found in nuclear membranes converts the hormone testosterone into DHT, which is the important, potent and active androgen in prostatic tissue because of its increased affinity for androgen receptor (AR). Binding of androgen to AR leads to receptor activation and which in turn bound with specific DNA sites in the nucleus which results in increased transcription of androgen dependent genes resulting in protein synthesis.[10] Castrations before puberty and other gene factors that reduce androgen production resulting in failure of development of BPH. Androgen withdrawal in established BPH leads to reduction in the size of BPH. Androgen withdrawal exert its effect by

vascular effects, inactivation of key androgen dependent genes like PSA and also by activation of key genes involved in programmed cell death. [11]

Another hormone Oestrogen play an unclear role as compared to its role in dogs where it play a role in pathogenesis of benign enlargement.

APOPTOSIS

It is also known as programmed cell death. Apoptosis is a physiologic mechanism important for the maintenance of normal glandular homeostasis. It occurs without activation of immune mechanism. It needs RNA and protein synthesis. Following castration, active cell death is more in luminal epithelium and also in distal part of prostatic ducts. TNF-β family of cytokines needed for this process. [12]

EMBRYONIC REAWAKENING THEORY

Paracrine type of communication exists between stroma and epithelium. Defect in the stromal component which normally inhibits cellular proliferation, leading to loss of normal braking mechanism. This process of new gland formation in the hyperplastic prostate suggests a "reawakening" of embryonic processes in which underlying prostatic stroma induces epithelial cell development. [13]

GROWTH FACTORS (GF)

These are proteins made of peptides that stimulate, or inhibit, cell division and differentiation processes. Cells that respond to growth factors have on their responding cells, cell surface receptors specific for that growth factor. Receptor in turn linked to a variety of trans membrane and intracellular signalling mechanisms. Lawson's team was the first to demonstrate that extracts of BPH stimulate cellular growth. This factor late found out as basic fibroblastic growth factor (b-FGF). [14]

Stimulatory growth factors includes,

1. Basic fibroblast growth factors
2. Acidic fibroblast growth factors
3. Integrin-2
4. Keratinocyte GF
5. Epidermal GF
6. Vascular endothelial growth factor (VEGF)
7. Insulin-like GF

Inhibitory factors,

1. Transforming growth factor-β

   - Down regulated in hyperplasia

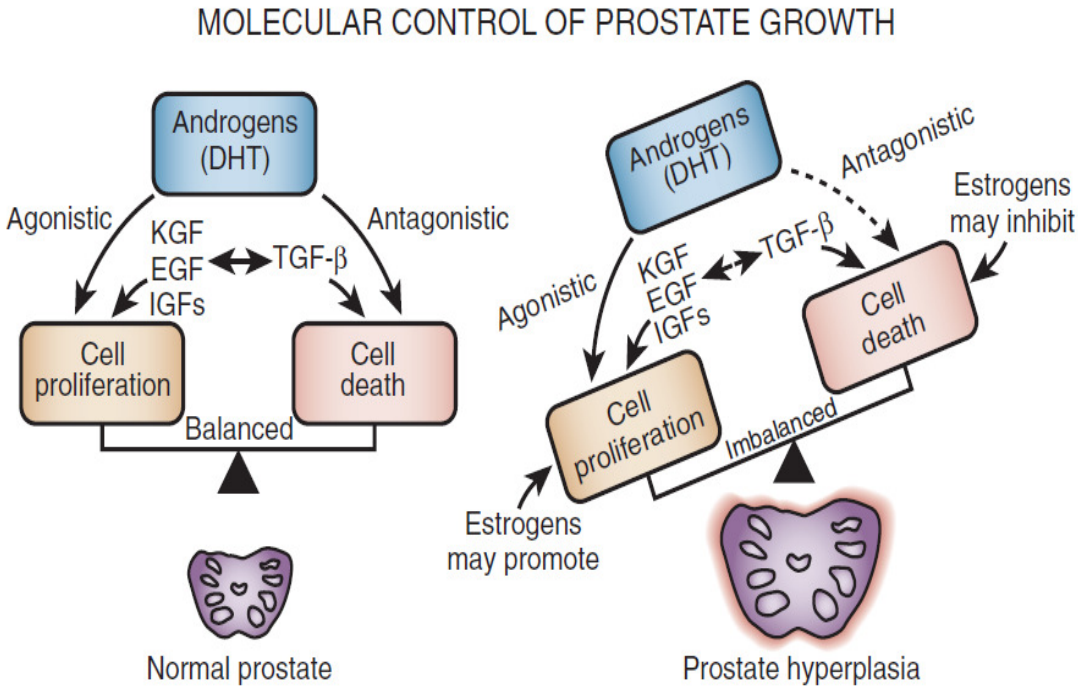


Figure 5 : Molecular control mechanisms involved in the development of hyperplasia

Inflammatory cell may act as source of these growth factors. Theyer and associates found increased number of inflammatory T cells in prostatic tissue of patients with BPH. [26]

OTHER SIGNALLING PATHWAYS

Sympathetic signalling pathways also play a role in the pathophysiology of LUTS. Evidence is increasing that alpha blockade, in some model systems, can induce apoptosis. Renin-angiotensin system (RAS) also are present in prostatic tissue and may be activated in BPH. [11,12]

PATHOLOGY OF BPH

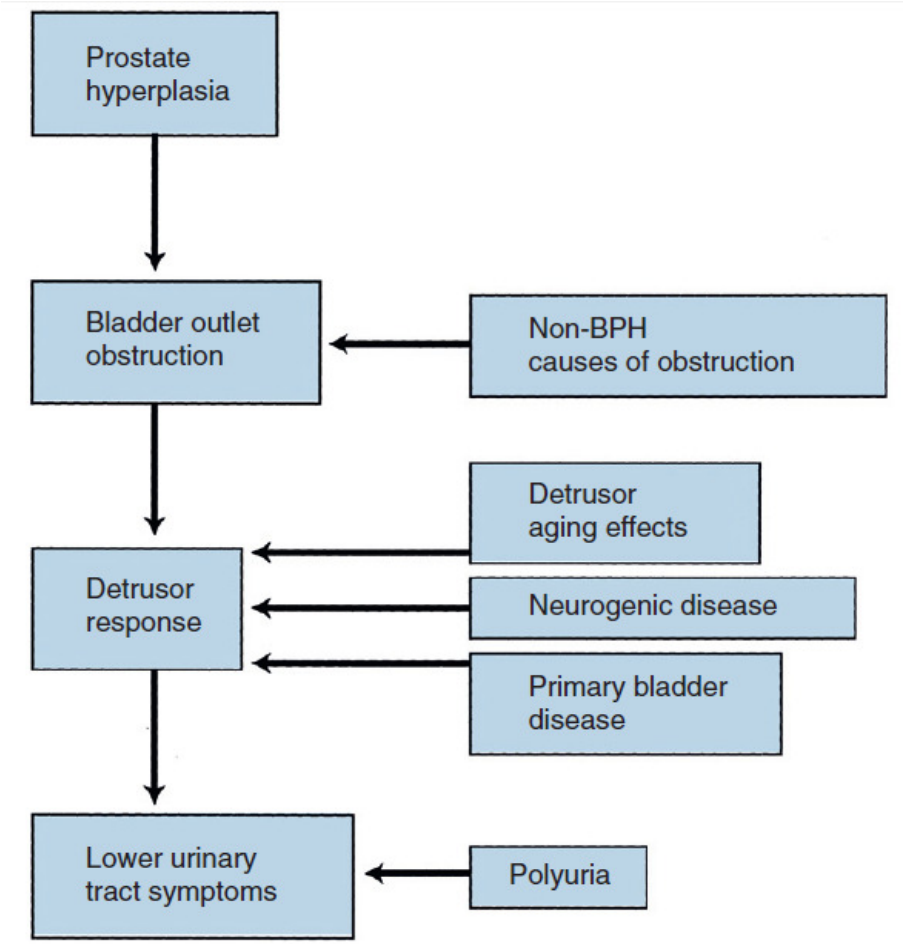


Figure 6 : Pathophysiology of benign prostatic hyperplasia

Hyperplasia occurs in the periurethral transition zone of prostate. Imbalance between death and proliferation of epithelial and stromal cells lead to enlargement of the prostate. It is marked by proliferation of glandular tissue which is the earliest change with minimal alteration of stromal elements.

Marked variability in stromal-epithelial ratios, such as small glands have predominant fibro muscular stroma and large glands demonstrate mainly

epithelial nodules. Smooth muscles play an important role in pathophysiology of BPH.

On the basis of autopsy studies, Barry and colleagues suggested that BPH is a gradually progressive disease which commences in men in their 40 years of age. Baltimore Longitudinal Study of Aging suggests the progressive nature of the enlarged prostate in aging males. The prostate volume increase by about 0.6 ml per annum. Mean fall in flow rate is about 0.2 ml/s/year

SYMPTOMS

Enlargement of produce wide variety of symptoms which are known as lower urinary tract symptoms and they can classified as obstructive and irritative. Previously they were named as voiding and storage symptoms respectively. The term lower urinary tract symptom (LUTS) was coined by Paul Adams. (Chapple et al, 2008).[27]

OBSTRUCTIVE SYMPTOMS

1. Hesitancy,
2. Thin stream,
3. Intermittency,
4. Post void dribble,
5. Decreased force of urination
6. Straining

IRRITATIVE SYMPTOMS

1. Nocturia
2. Frequency
3. Dysuria

EVALUATION OF BPH

Symptoms are the primary guidance in the management of BPH, hence adequate evaluation and the subjective assessment of the symptoms should be done. Initial evaluation is begins with detailed history with complete and systematic examination including detailed per rectal examination (DRE) and focussed nervous system examination. This is followed by complete urine analysis, culture and sensitivity and assessment of renal functions.

ULTRASOUND

Either Trans abdominal or Trans rectal can be done with Trans abdominal being more common .Trans abdominal USG uses 3.5 MHz probe and high frequency 7-10 MHz probes in Trans rectal ultrasound. Volume of prostate calculated by depending on the shape of the prostate like if prostate is ellipse ($\pi/6 \times$ transverse diameter $\times$ AP diameter $\times$ longitudinal diameter), sphere ($\pi/6 \times$ transverse diameter^3), or a prelate (egg-shaped) spheroid ($\pi/6 \times$ transverse diameter$^2 \times$ AP diameter).

Upper urinary tract imaging is only recommended in,

1. Patients presenting with haematuria,
2. Associated or suspected urinary tract infection,
3. Elevated renal parameters
4. History of renal stones
5. Previous genito - urinary tract surgery.

Ultrasound abdomen and pelvis advised in previously mentioned conditions with due importance also given to measure prostate volume and residual urine. Post void residual (PVR) is defined as " the amount of urine which remains in the bladder immediately after micturition". Catheterisation techniques and USG has been used to measure PVR. The mean PVR in normal patients is about 0.53ml. [17]

In above conditions patient may need a computerized tomography for complete evaluation. Serum PSA (Prostate Specific Antigen) is done in patients with the family history of prostate cancer and suspected DRE findings.

This subjective assessment is not without problems because of each individual has different tolerance levels for symptoms hence various symptom scales were devised and validated on large groups of populations. The most useful, most validated and commonly used scale is the IPSS (The International Prostate Symptom Score). This scoring system is recommended as tool for

evaluating patients present with LUTS.[18] In addition to the subjective assessment ,objective assessment is done with uroflowmetry which asses the urinary flow rate. This test is easily available and can be done at bedside. The peak flow, mean flow and voiding times of the patient are measured by uroflowmetry test. Even though urodynamic studies are considered as gold standard test [19] for evaluating the patients with LUTS they are not routinely done for all BPH patients.

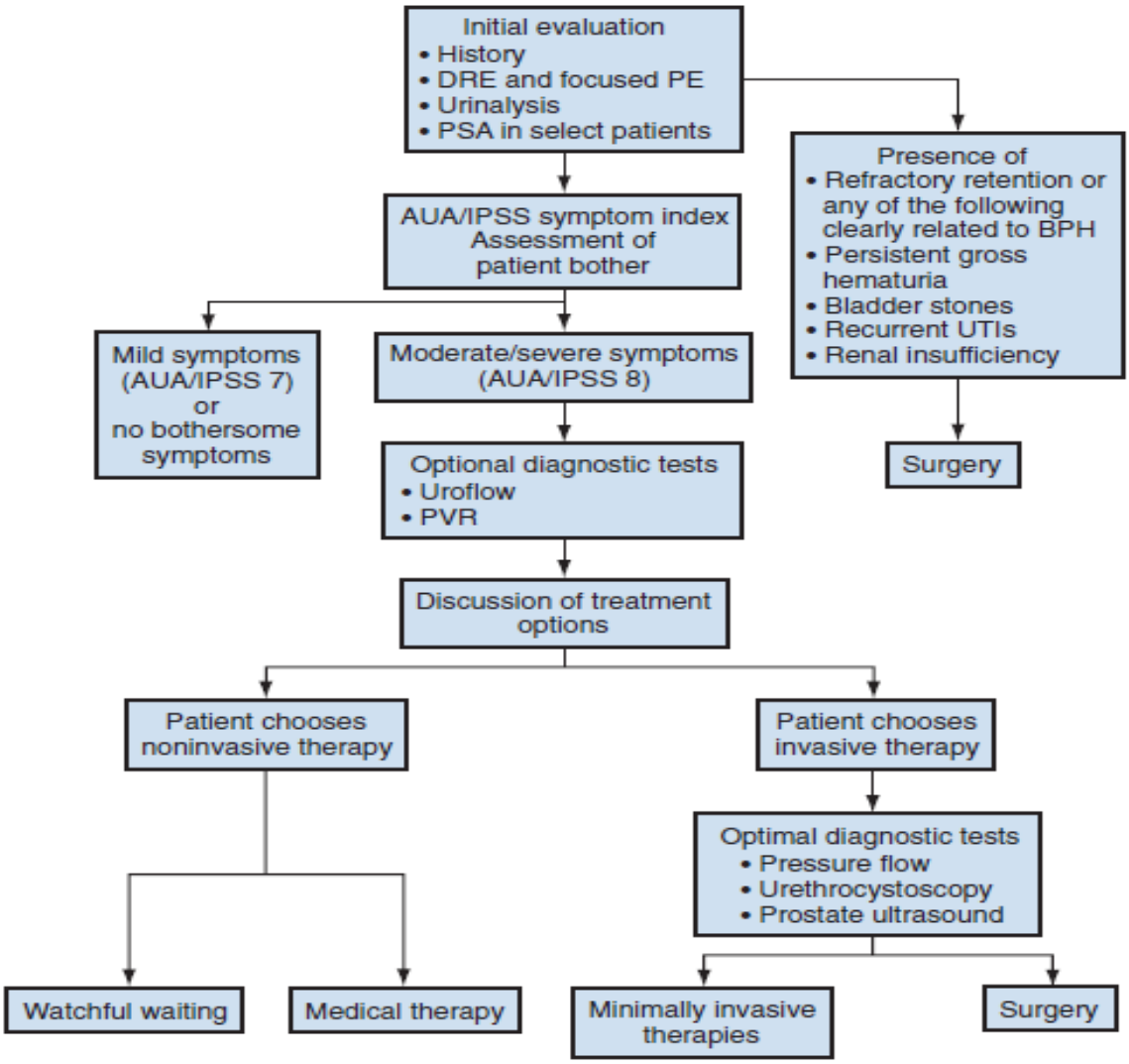


Figure 7 : Guideline algorithm for Evaluation of benign prostatic hyperplasia.

Urodynamic studies may be indicated in following situations, (EAU 2012)

a. cannot void > 150 mL;
b. When Qmax is less than 15 ml/second,
c. Age less than 50years or more than 80years,
d. Patients with more than 300 ml of residual urine ,
e. Suspicion of neurological bladder dysfunction,
f. Patients with both side hydronephrosis,
g. Previous radical surgery in pelvis,
h. Failed invasive treatment.

EVALUATION - INTERNATIONAL PROSTATE SYMPTOM SCORE

It is also known as 'American urological association symptom index' (AUASI). The Measurement Committee of the American urological association (AUA) developed the IPSS/AUASI.[20] AUA/IPSS symptom score is reliable, validated and clinically useful scale to subjectively measure the symptoms and problem magnitude of the patients with benign enlargement of prostate. IPSS cannot be solely used to confirm the diagnosis of prostate enlargement. IPSS is the available best tool to grade the symptom severity, assessment of responsiveness to therapy and used to detect the symptom progression in patients with BPH who are managed with conservative management. Multiple factors should be considered before using IPSS

questionnaires.[21] First, internal consistency reliability of the test must be confirmed .Next, the test-retest reliability of the given questionnaire should be established. This may be done by demonstrating the minimal change of the given results when the test is repeated on the same patients after a short period. Third, a questionnaire should have the same degree of accuracy as any other diagnostic test used to assess the disease process. To considered as valid test, the symptom score results must exactly quantify the severity of BPH ("as serum lipid levels test reflecting the disease status in patients with hypercholesterolemia"). Finally, these scales should be useful in discriminating among the patients who get better or get worse, or remain the same with or without proposed treatment over a period of time. Based on above criteria the AUA/IPSS questionnaire is highly reliable and valid scale for evaluating men with LUTS. Internal consistency reliability and 1-wk test–retest correlation for IPSS was about 0.86 and 0.92, respectively. [20]

The IPSS score consists of seven questions corresponds to symptoms commonly seen in patients with BPH. They are,

1. Incomplete emptying,
2. Frequency,
3. Intermittency,
4. Urgency,
5. Weak stream and

6. Straining
7. Nocturia

Every question have zero to five points when all added together gives a score between zeros to thirty five. Point 0 stands for not at all patient experienced the symptom and 5 for almost always patient having the symptoms.

Based on total IPSS patients can be classified into having mild, moderate or severe symptoms. [22]

0-7 - Mild symptoms

8-19 - Moderate symptoms

20-35 - Severe symptoms

Only assessment of IPSS alone does not helpful in confirming the BPH, because patient's perception of symptoms are different for each patients. Overall, the IPSS is reliable and valid through a variety of testing modalities.[21]. Apart from this score, different types of scores like bother score and QoL index are useful in deciding the further management.

QUALITY OF LIFE (QOL) INDEX

The QoL index (Appendix 5) is a single question item which is assessed along with AUA symptom index and is considered as a part of the IPSS score.

QoL assess the degree to which the symptoms bothering the patient. Response ranges from 0-6.

UROFLOWMETRY

Uroflowmetry is “rate of urine flow over time.” It is done by graphic recording of the urinary flow rate during the act of voiding. It is commonly used simple, non-invasive, and easily available. It is nonspecific test. Peak flow rate cannot differentiate BOO from impaired detrusor contractility. It is used as screening test for voiding problems & for deciding need for more complex urodynamic tests.

Modern uroflowmeters use,

1. Use weight, (Gravimetric method)
2. Electrical capacitance, or
3. Rotating disc.

The regularly used meters are the Gravimetric flow meters which functions by measuring the weight of the collected urine or by measuring the hydrostatic pressure developing at the base of the collecting cylinder during the act of micturition. Flow measured in ml/second.

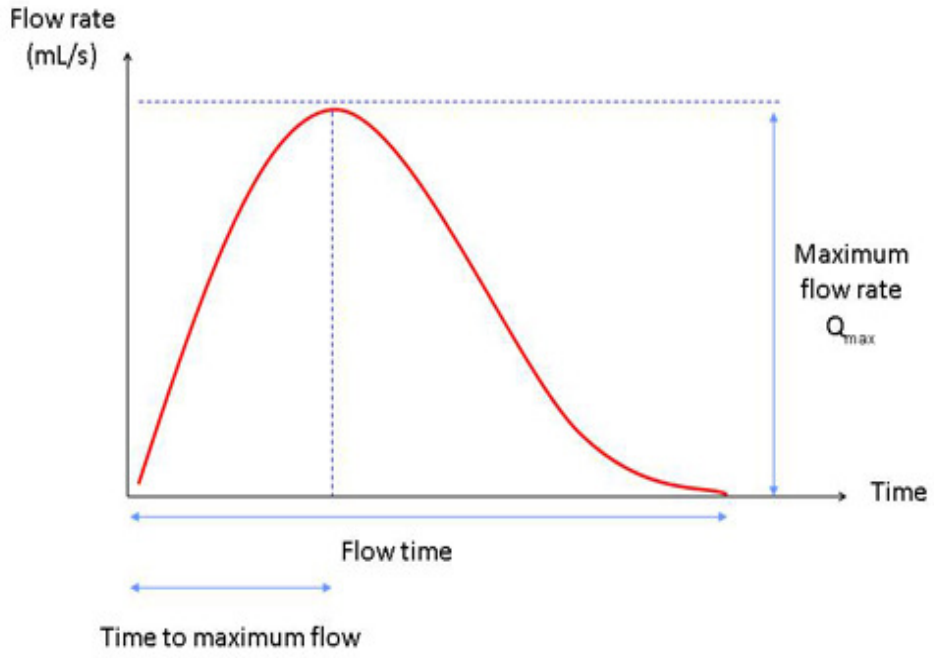


Figure 7.Normal bell shaped uroflow curve

The AHCPR Guideline for uroflowmetry (McConnell et al, 1994) [18]

1. Flow rate is not correct if patient passes less than 125 to 150 ml of urine.
2. Flow rate is the single best non-invasive test for detecting the obstruction below bladder. No "cut-off" value fixed so far.
3. The peak flow rate (PFR; Qmax) is more specific in BPH
4. No adjustment in values for change in age and decreasing voided volume
5. Qmax more than 15 mL/sec may be associated with poorer surgical outcomes after prostatectomy.
6. A Qmax less than 15 mL/sec can't separate bladder obstruction from decompensation.

Qmax is shown to predict the response to surgery. It is a useful test in follow up of patients treated for BPH.

URETHROCYSTOSCOPY

Urethrocystoscopy is not routinely recommended. It is only recommended in following situations,

1. History of microscopic or gross haematuria,
2. Urethral stricture disease
3. Suspected neoplasm of bladder
4. Prior surgery
5. When surgical treatment is planned.

MANAGEMENT

Management of men with enlarged prostate depends on symptom severity which is assessed by IPSS and other associated factors and patient's willingness for given treatment. As for any other disease both medical and surgical managements are available apart from watchful waiting.

Watchful waiting is advocated for patients with mild or moderate score which is not affected the day today activities of the patient.

Treatment options available for patients with bothersome moderate to severe symptoms of BPH (IPSS > 8) include watchful waiting and the medical, minimally invasive, or surgical treatment.

Management of the patients diagnosed with enlarged prostate due to benign prostatic hyperplasia depends on symptomatology of the patient and objective assessment results. Treatment options available range from simple watchful waiting to open prostatectomy. In between the spectrum are medical management with alpha blockers or 5 alpha reductase inhibitors and various minimally invasive and endoscopic procedures like TURP, Transurethral needle ablation of prostate (TUNA), transurethral ultrasound–guided laser-induced prostatectomy (TULIP), transurethral vaporization of the prostate (TUVP), transurethral incision of prostate (TUIP) are various endoscopic options available for the treatment of BPH . Surgical treatment provides sustainable long term results in the management of BPH as compare with the medical management with drugs.

MEDICAL MANAGEMENT

For the treatment of enlarged prostate with medications, two groups of drugs are available. First one is alpha receptor blockers and second group is 5-alpha reductase inhibitors.

Alpha blockers act by decreasing the tone of the bladder neck and prostatic smooth muscle. They are divided into

1. Non selective - Phenoxybenzamine
2. Alpha 1 selective – Prazosin, Alfuzosin IR, Indormin.
3. Long acting alpha I selective - Doxazosin, Terazosin, Alfuzosin SR
4. Super selective - Tamsulosin and Silodosin.

Most commonly used one is Tamsulosin which is super selective alpha blocker. Newer addition is Naftopidil.

The 5 alpha reductase inhibitors, inhibit 5 alpha reductase which converts testosterone into dihydrotestosterone. The drugs are finasteride and dutasteride. They reduces the prostate size on long term treatment. 20% reduction in volume has been reported with finasteride use alone.[23] Safety and efficacy of these drugs are well established but clinical improvement is modest and not sustainable. Most of the patients with mild to moderate symptoms on medications slowly progress into higher groups and may need surgical treatment as a definitive management. Drugs are mainly used in patients with mild symptoms and small glands.

SURGICAL MANAGEMENT

Most commonly done surgical procedure for BPH treatment is endoscopic transurethral resection of the prostate and this procedure is

considered as gold standard for the treatment of BPH. TURP is commonly done by using monopolar energy and nowadays rise in the usage of bipolar TURP.

HISTORY OF ELECTROSURGERY AND THE RESECTOSCOPE

The invention of incandescent lamp by Edison, the cystoscope by Nitze and Lieter, the development of fenestrated tube by Hugh Hampton-Young and the resection wire loop by McCarthy were important in the field of endourology which reduced the rate of open surgeries in urology with less morbidity to the patient with desirable results.

In 1932 McCarthy designed tungsten loop for resection and it was developed with available cystoscope, light and electrical power and high resistance loop. In 1970 advent of Hopkins rod lens system and fiberoptic lighting made visualization better. In 1980 video urological procedures were introduced. Thick loop electrode allowed for increased coagulation while removing larger tissue bits.

The first commercial bipolar coagulator was designed and built by Dr.malis in 1955. This bipolar system uses a 1 MHz waveform for cutting and coagulation of tissues. A majority of monopolar systems use1000-3000 Vrms. Bipolar system uses only about 220 to 320 Vrms, because of this reduced amount localized tissue damage.

The advantages of bipolar system are,

1. Less tissue dehydration, carbonization and tissue reaction.
2. Less bleeding
3. Can be used in patients with cardiac implant devices.
4. Clear view at operative site
5. No grounding pads
6. Can be used in saline
7. Minimal tissue damage
8. Less tissue charring
9. Distinct circuitry and waveforms.

In 1926, Stern was the one who introduced resectoscope subsequent to which there have been modifications in the resectoscope design. [28]

The resectoscope designed by Stern was a rack and pinion model which was operated by both the hands and a tungsten loop slid front and back to make the resection. It had an outer sheath which allowed irrigation, passage of telescope and working element. With the Stern resectoscope sheath a tubular cylinder of tissue was resected using high frequency current. Although effective in resecting the prostatic mass, it was difficult to engage the bladder tumours with this instrument. [28]

McCarthy who modified the Stern resectoscope by incorporating Bakelite to the tip of the sheath and thereby making it possible to work when the current was applied and also prevented the risk of electric burns to the operating surgeon.[29] Nesbit is regarded for his unique contribution of single handed spring action working element which permitted safe resection. [30]

Iglesias proposed a model as early as 1979 is which is very much similar to Nesbit, he introduced the continuous flow resectoscope sheath which speeded up the resection at the compromise of larger sheath size. The Iglesias sheath essentially had two sheaths, of which the larger outer sheath for irrigation and smaller inner one for drainage. Advantages of this design include it is operated by single hand, loop is inside the sheath in resting position and unique continuous flow design which keep the bladder pressure low and a buy in the resection time. Thus the incidence of TUR syndrome should be theoretically low.[31]

Monopolar TURP

TURP can be performed under spinal or general anaesthesia. First cystourethroscopy done after dilating the urethra. Before proceeding with the resection a thorough inspection of urethra, verumontanum, prostate, bladder neck, entire bladder mucosa and both ureteric orifices is done. 24 Fr or 27 Fr resectoscope used for resection of the prostate. Either sterile water or glycine is used as the irrigant. Thick loops are usually used. The technique used for

resection was first described and standardised by Nesbit in 1943 [24] and later modified and by many investigators. But the basic principles remain the same. Controlled resection, limiting the resection proximal to verumontanum, not violating the capsule and not undermining the bladder neck remains the most important steps of TURP. Complications include

1. Bleeding,
2. Trans urethral resection syndrome,
3. Priapism,
4. Post -operative incontinence,
5. Failure to void, etc.

Bipolar-TURP

The surgical technique is similar to monopolar. In monopolar electro surgery the electric current is passes from the active loop then through the tissues (patient), and exits through the indifferent electrode placed abutting the patients skin and back to the electro surgical unit to complete the circuit. The heat generated at the loop-tissue interface is used for resection.

In bipolar the large return electrode of the monopolar is replaced with a second small electrode. The path of the electric current is from the active loop, through the conducting irrigant, through the patient's tissue, to the second indifferent electrode which is placed very close within the same loop and then

back to the electrosurgical generator. Two electrodes are combined in the instrument. Current passes between tips and not through patient. Hence, there is no current flowing through the patient's body.

CREATION OF PLASMA

In Bipolar resection, Current flows through the saline because impedance is lower in saline than in body tissue. Air bubbles are created around the loop by the heat caused from current flow. The whole loop is covered by small bubbles.

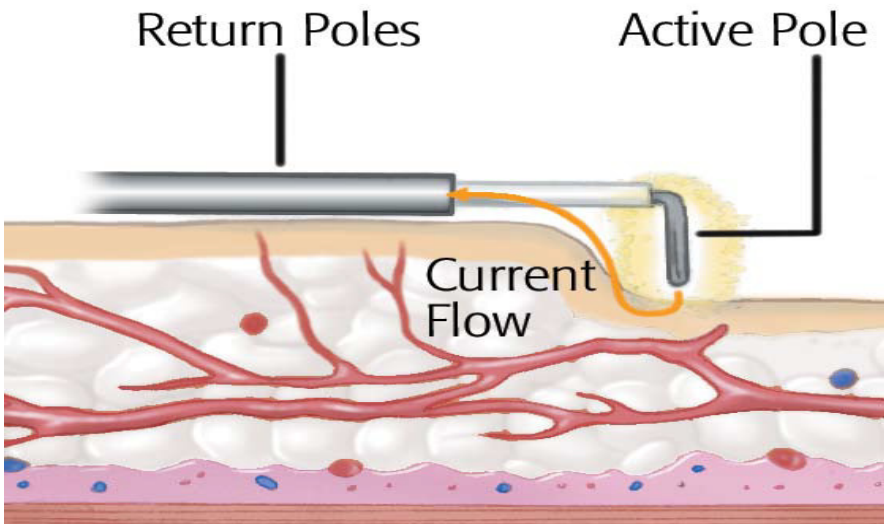


Figure-10 Endoscopic view showing orange colour plasma

Finally the loop is coated by an insulation layer. At this point Sodium ions are excited. Current is discharged to the air surrounding the electrode,

similar to lightning. Then the electrode is covered by plasma. Resection is made by the heat of the plasma created around the electrode (Figure-8).

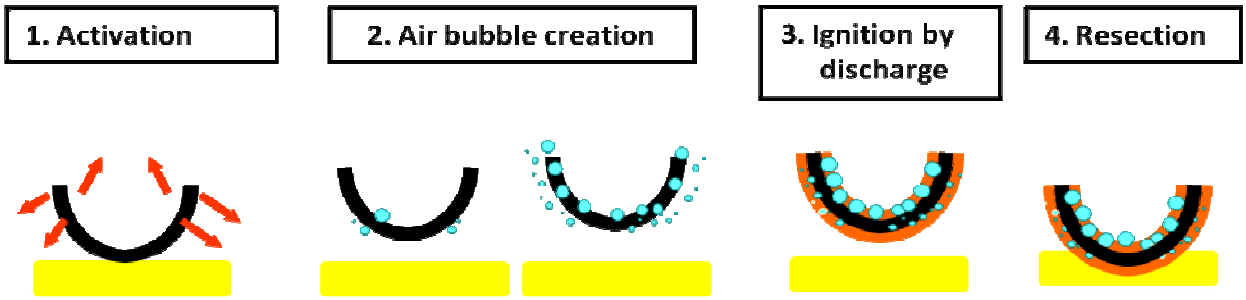


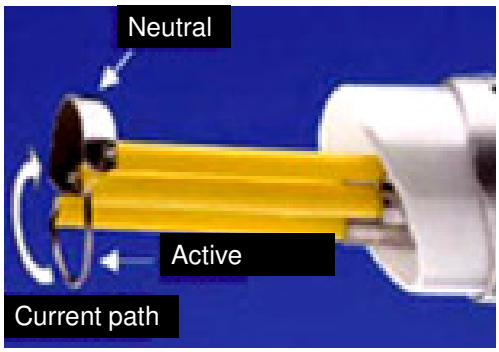
Figure -8 Formation of PLASMA

The colour of plasma formed in saline is orange colour and it depends on ion present in the irrigation fluid. The path of the current in resection loop is from active electrode, through the saline, through the tissue and back to the indifferent electrode close to active loop.

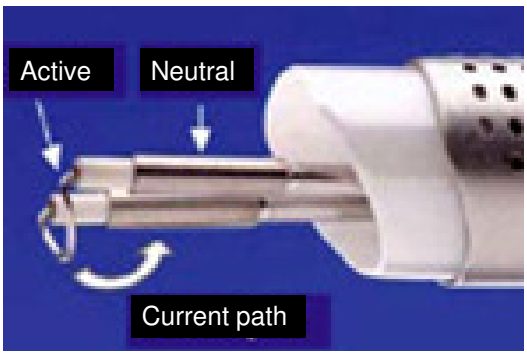
Figure-9 picture showing bipolar loop with plasma

A number of bipolar loop designs are available in the market depending on the manufacturer.

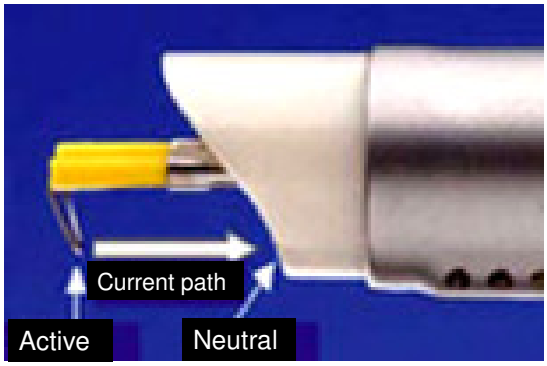
VARIOUS LOOP DESIGNS



Storz



Gyrus



Olympus

The loops are designed so that both the electrodes are placed closely. The Olympus system used the resectoscope sheath as the neutral electrode. The Gyrus loops are so designed that the neutral electrode is incorporated into the stem of the loop and active and neutral electrodes are separated by insulation.

Various randomized and nonrandomized studies were conducted all over the world and they compared the safety and outcomes of the monopolar

and bipolar TURP. Monopolar TURP is till now the gold standard procedure in the endoscopic management of BPH but certain morbidities like intraoperative bleeding, fall in haemoglobin, fall in sodium and TUR Syndrome can occur with monopolar TURP.[34] These complications can be reduced by using bipolar TURP and various studies had shown different results with bipolar TURP. Even though these advantages were studied and efficacy and safety of bipolar TURP have been published, still monopolar TURP remains the gold standard for BPH.

MATERIALS & METHODS

The following are the materials and methods employed for the present study titled "**COMPARISON OF OUTCOMES OF MONOPOLAR TRANSURETHRAL RESECTION VS SALINE TRANSURETHRAL RESECTION (BIPOLAR) OF PROSTATE IN PATIENTS WITH BENIGN PROSTATIC HYPERTROPHY".**

Period of study:

The study is done between April 2012 and Feb 2013

Type:

This is a prospective study to compare the clinical outcomes in terms of symptom improvement and early postoperative results after monopolar or saline transurethral resection of prostate for benign prostatic hyperplasia.

Place:

The study is conducted in the Department of Urology, Rajiv Gandhi Government General Hospital & Madras Medical College, Chennai.

Inclusion criteria

Patients of age more than 50 years with lower urinary tract symptoms due to benign prostatic hypertrophy

Exclusion criteria

- Prostatic cancer,
- Urethral stricture,
- Neurogenic bladder,
- Prostatitis,
- Active urinary infection and
- Previous Prostate surgery.
- Patients with coagulopathy

Method of Study

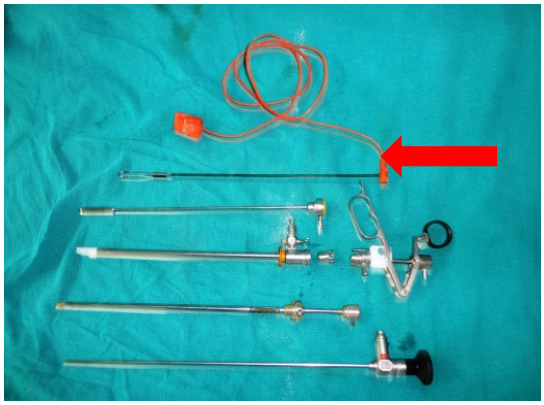
Institutional Ethics Committee approval was obtained. Informed consent was taken from all patients who underwent surgery. All patient details were recorded as per the proforma (Appendix-4). Patients were randomized into two groups of 75 each to undergo TURP either with Monopolar TURP (Group 1) or saline bipolar transurethral resection (Group 2). In monopolar group (Group 1) Glycine was used as irrigant and in bipolar group (Group 2) saline was used as irrrigant.[32] We used the Gyrus ACMI PK system and used PK thick loop for resection for bipolar group. The settings we employed was 160W cutting and 80W coagulation for bipolar resection. Martin ME MB2 monopolar system was used for monopolar TURP and the setting used was 120W for cutting and 60W for coagulation.

The setup of instruments for monopolar TUR resection is well known. It includes 24 – Fr. Karl Storz non-continuous flow sheath with blind and visual obturator, resectoscope, monopolar loop, high frequency cord, 30 degree Karl Storz telescope and diathermy. But the setup used for bipolar TUR resection is almost the same as monopolar with certain modifications as mentioned below.

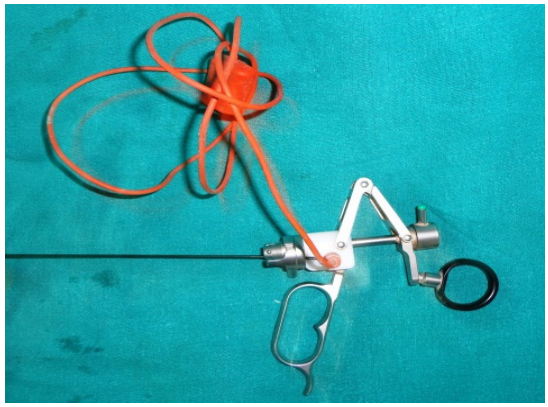
The working element is modified and has no shaft. There is a modified slot for engaging the bipolar loop. The working element is provided with an adaptor so that it can easily and correctly fit into the regular resectoscope sheath normally used for monopolar. The resection loop used in bipolar group also different from the conventional monopolar loop. It is much sturdier to compensate for the shaft which is absent in working element. The high frequency cable is integrated into the loop hence loop cannot be separated from the cable as we does in monopolar loops. There is also a leak proof wiser present in the shaft of the loop.

The basic setup for bipolar resection is given in the figure below.

GYRUS ACMI PK SYSTEM

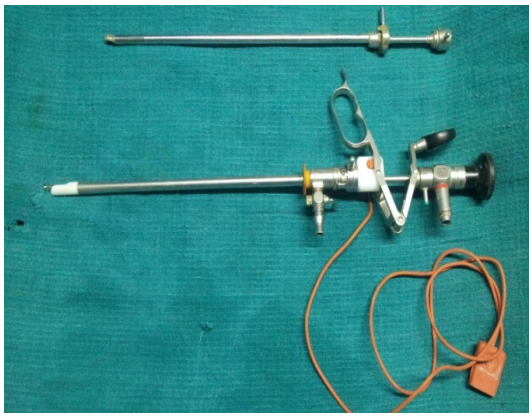


Full Bipolar Set



Working Element With Bipolar Loop

Modified working element



Assembled bipolar set

PREOPERATIVE WORKUP

Complete clinical history was taken from all patients. Preoperative IPSS and quality of life index score (QoL) was recorded for all patients. Co-morbid conditions like Hypertension, Diabetes Mellitus, and Ischemic Heart Disease were documented. Complete and systematic examination of the patients were done including genital and rectal examination.

In both the groups complete urine analysis, Urine culture and sensitivity were done and patients with positive cultures were treated with appropriate antibiotics. Complete haemogram and renal function tests with electrolytes, (sodium, potassium) coagulation parameters, Blood grouping and typing were done in the preoperative period. X-ray KUBU was taken and Ultra sonogram of KUB region was done. Uroflowmetry was done for appropriate patients. Anaesthetic fitness obtained and all the resections were performed by our Senior Professors they are well experienced in performing TURP.

All patients after exclusion criteria and complete evaluation were subjected to either Monopolar or Bipolar TURP. Spinal anaesthesia was used for all patients and patients underwent the procedure in lithotomy position. Preliminary cystourethroscopy was done to assess the anterior urethra, verumontanum, prostate gland, and bladder mucosa & ureteric orifices. A 24-F Karl Storz non-continuous flow resectoscope with Baum Rucker type of active

working element was used for resection with glycine as irrigant for Monopolar TURP (Group 1) and saline as an irrigant for Bipolar TURP (Group 2).

The resection time of all procedures were calculated from the period of initiation of resection to the removal of resectoscope sheath. For all patients, resection time, any intraoperative complication were noted and 3-way Foley catheter was inserted at the end of the procedure and irrigation was started and continued postoperatively. After the procedure specimens were packed properly and sent to pathology department for histopathological examination.

Postoperatively all patients were monitored for haematuria, altered sensorium and any change in vital parameters. In the post-operative period blood sent for haemoglobin, pack cell volume (PCV) and serum sodium, & potassium. Irrigation continued till next morning as a protocol for all patients and continued if necessary after that. Catheter removed on fourth postoperative day and discharged on the same day. Patients were reviewed with biopsy report and postoperative IPSS, QoL were recorded and Uroflowmetry was done during first month follow up. Changes in preoperative and postoperative parameters like IPSS, quality of life (QoL), maximum flow rate (Qmax), haemoglobin, pack cell volume, sodium were analysed.

STATISTICAL ANALYSIS

Descriptive statistics were used to illustrate the study population. The statistical significance of these correlations was assessed using a two sided p-value. A p-value of <0.05 was considered as statistically significant. The Chi Square test was used to assess the statistical significance. A commercially available computer software package (Statistical Package for the Social Sciences (SPSS) version 17) was used for statistical analysis.

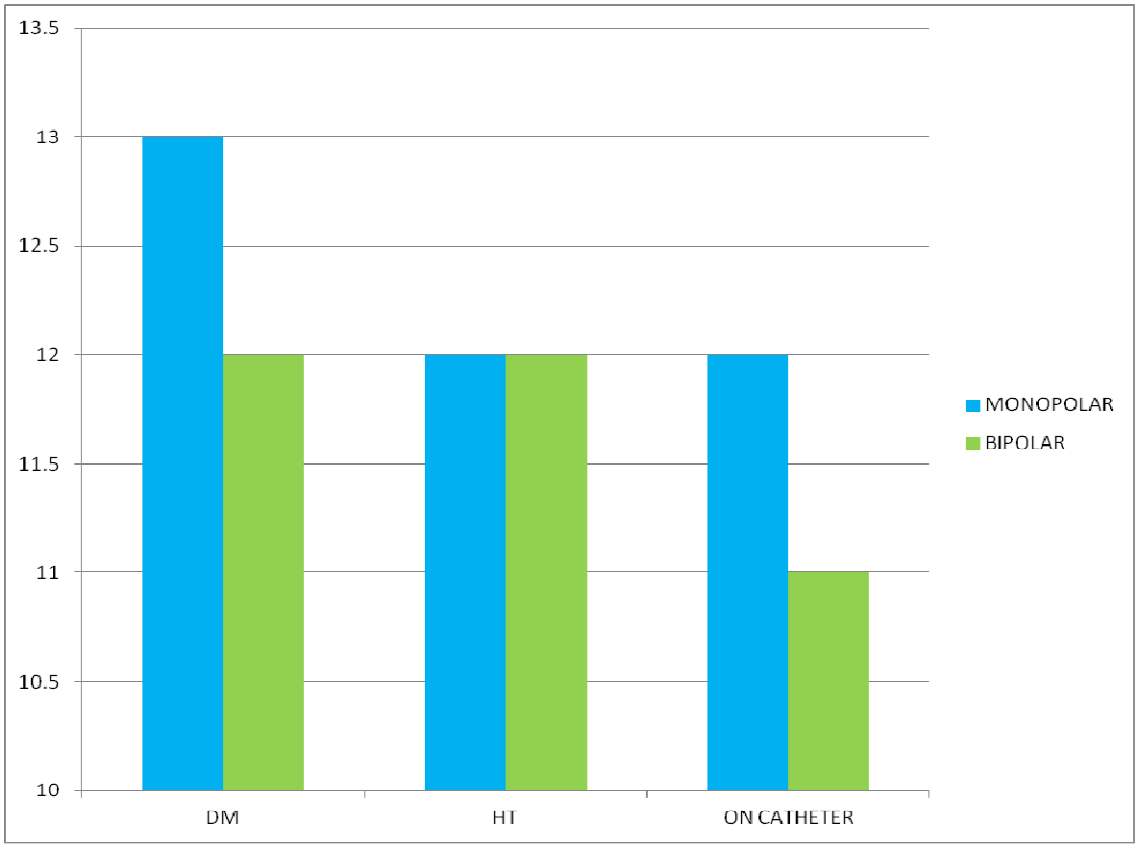
RESULTS

Total of 150 patients were randomized and participated in the study. Demographic data of the group 1 and group 2 are given in Table 1.

TABLE 1. DEMOGRAPHY

FACTORS	MONOPOLAR	BIPOLAR
TOTAL NUMBER	75	75
AGE IN YEARS	65.33	65.97
ON CATHETER	12	11
DIABETES MELITUS	13	12
HYPERTENSION	12	12

Mean age of patients in monopolar and mean age of bipolar group patients are 65.33years and 65.97 years respectively. In the both monopolar and bipolar group, patients with diabetes mellitus, hypertension and on Foley's catheter is almost equal. In monopolar group this was 13, 12 and 12 patients respectively and in bipolar group this was about 12, 12 and 11 patients respectively. As for as these factors are considered both the groups are equally matched.



When comparing the monopolar and bipolar groups regarding the age distribution and prostate volume it was found that in monopolar group mean age of the patient was 64.33years and standard deviation was 7.095 and in bipolar group mean age of the patient was 65.97 years and standard deviation was 8.269.and statistically there is no difference in both the groups. (TABLE.2)

TABLE.2. Age and prostate volume comparison

	GROUP	N	MEAN	SD
Age in years	Monopolar Bipolar	75 75	64.33 65.97	7.095 8.269
Prostate volume	Monopolar Bipolar	75 75	35.51 35.59	6.143 5.776

Table 3 : Comparing the preoperative markers such as IPSS, Maximum flow rate (Qmax), quality of life index (QoL), haemoglobin, pack cell volume and sodium in monopolar and bipolar group.

TABLE 3.Preoperative data s of monopolar & bipolar group.

VARIABLE	Group	N	Mean	Std. Deviation	P value
Maximum flow rate (Qmax)	Monopolar	64	9.5766	1.01899	.637
	Bipolar	63	9.4841	1.18120	.638
IPPS	Monopolar	75	23.17	1.996	.282
	Bipolar	75	22.84	1.779	.282
Haemoglobin.	Monopolar	75	12.380	.8847	.694
	Bipolar	75	12.316	1.0925	.694
PCV	Monopolar	75	36.15	2.593	.833
	Bipolar	75	36.05	2.804	.833
Sodium	Monopolar	75	139.60	2.922	.870
	Bipolar	75	139.52	3.073	.870
QOL	Monopolar	75	3.93	.723	.826
	Bipolar	75	3.96	.761	.826

Mean of Q max in monopolar group was 9.58ml/second and in bipolar group was 9.48ml/second. Similarly IPSS in monopolar and bipolar group is 23.17 and 22.84. Quality of life index (QoL) of monopolar and bipolar is 3.93 and 3.96. Mean haemoglobin and PCV in monopolar group was 12.38gm % and 36.15 as compared to bipolar group value of 12.316gm% and 36.05 which is similar between two groups. Mean sodium level in monopolar and bipolar is 139.60meq and 139.52 meq respectively. All these preoperative factors were comparable and equally distributed between both the groups. In statistical analysis there is no significance found between the groups. So both the groups are similar as for as pre -operative factors are concerned.

Table.4 compares the prostatic volume and intraoperative resection time in both monopolar and bipolar groups. Mean prostate volume in monopolar group is 35.51grams with the standard deviation of 6.185.In bipolar group mean prostate volume is 35.51grams with the standard deviation of 5.854.Hence prostate volume is similar in both the groups with the p value of 935.

TABLE 4

	Group	N	Mean	Std. Deviation	P value
VOL	Monopolar	75	35.51	6.185	.935
	Bipolar	75	35.59	5.854	.935
OP TIME	Monopolar	75	41.99	5.020	.001
	Bipolar	75	45.11	4.029	.001

Intraoperative resection time in monopolar group is about 41.29 minutes with standard deviation of 5.020 .For bipolar intraoperative resection time is about 45.11 minutes with standard deviation of 4.029.In Independent Samples Test this difference is significant with the p value of less than 0.001.

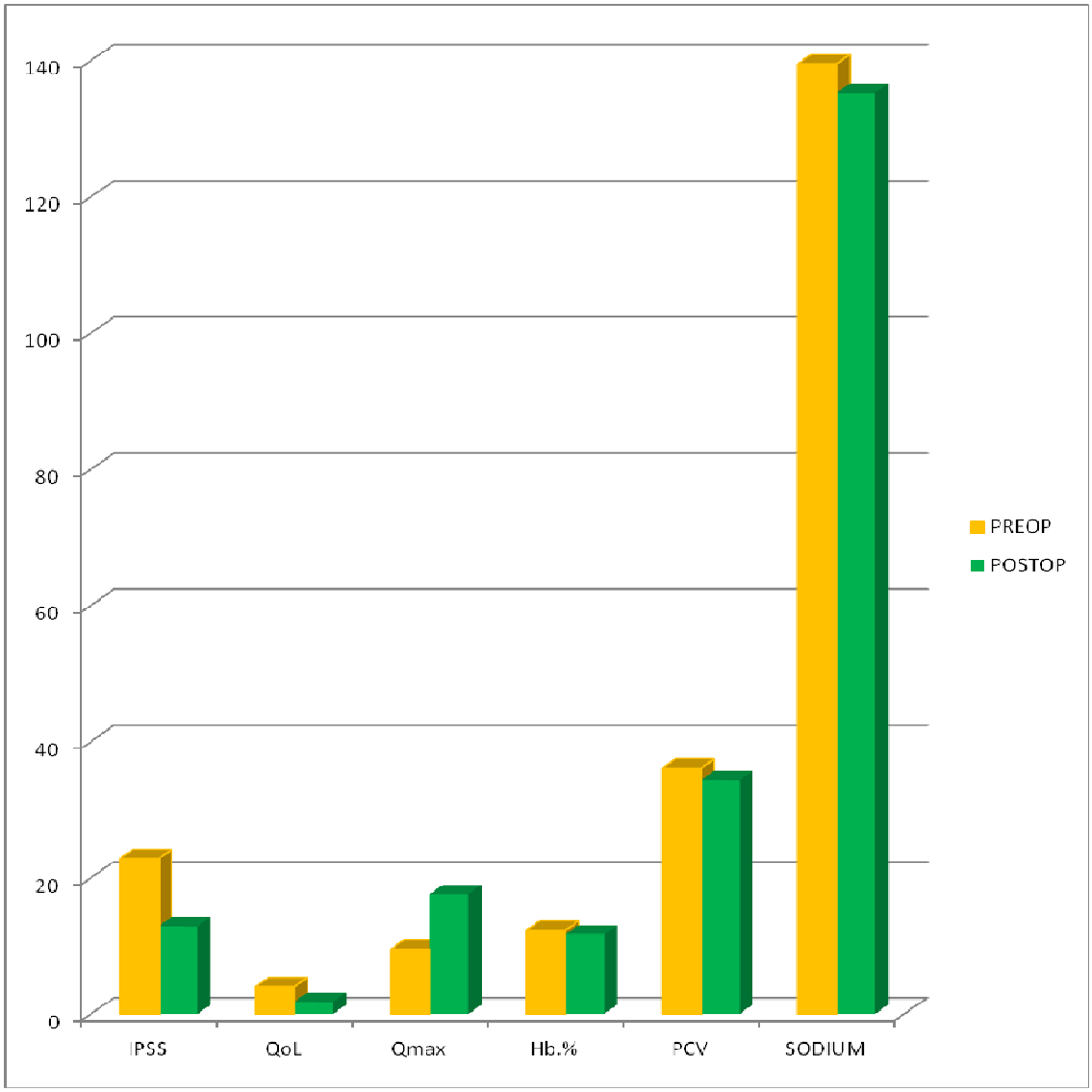
In the post-operative period there was fall in serum sodium, haemoglobin and change in PCV. Monopolar group had fall off 7 meq of sodium and in bipolar group it was about 4 meq. This fall in sodium is statistically significant.

Fall in haemoglobin is about 0.58 gram% in bipolar group and is more in monopolar group with a fall of 0.71 gram% .But this fall is only in numbers it is not statistically significant.

Table 5- Postoperative data

	Group	N	Mean	Std. Deviation	P value
QMAX - POST	Monopolar	64	17.7578	.74510	.376
	Bipolar	63	17.6349	.81244	.376
IPPS - POST	Monopolar	75	12.75	1.569	.400
	Bipolar	75	12.96	1.528	.400
Hb - POST	Monopolar	75	11.673	.8834	.672
	Bipolar	75	11.743	1.1035	.672
PCV - POST	Monopolar	75	34.47	2.522	.794
	Bipolar	75	34.35	3.069	.794
NA - POST	Monopolar	75	132.93	3.090	.001
	Bipolar	75	135.29	3.200	.001
QOL - POST	Monopolar	75	1.87	.577	.650
	Bipolar	74	1.82	.558	.650

Also there is change in PCV of about 1.71 in monopolar group and 1.68 in bipolar group.



IPSS one of the important parameter which decrease in both the groups and this fall in score is desirable and it indicates successfulness of surgical management. Fall in IPSS is about 10.43 points in monopolar group and 9.88 in bipolar group by the end of first postoperative month. This improvement in symptom score is statistically significant.

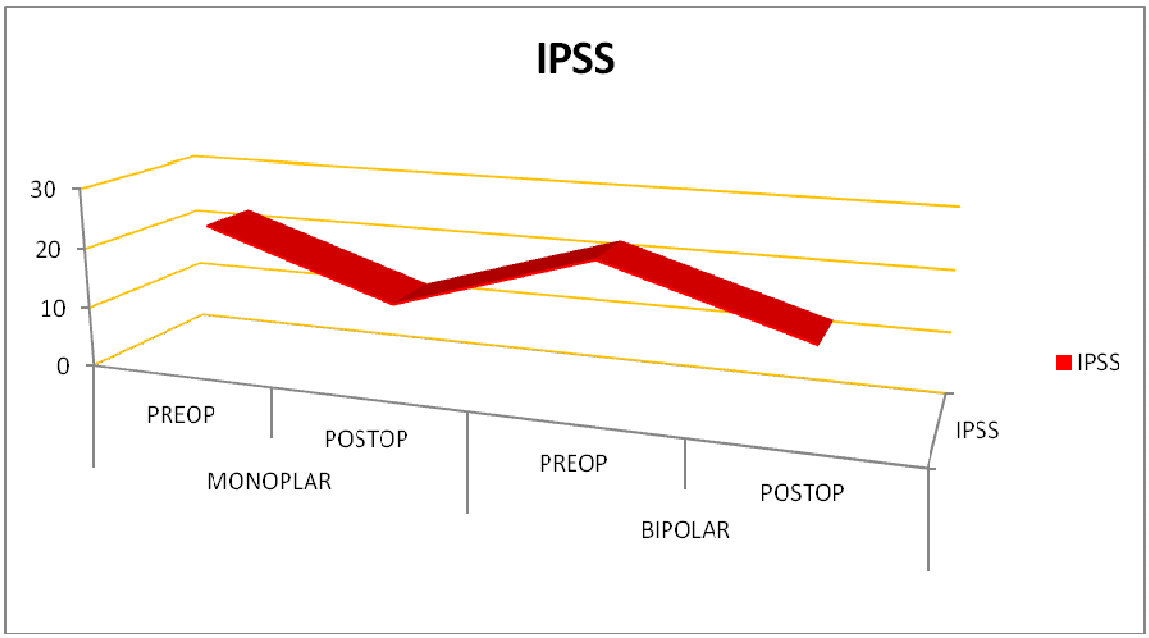


Figure 3.IPSS fall in mono and bipolar group

Maximum flow rate improved by 8.15 ml in bipolar group and 8.18 ml in monopolar group. Quality of life score decreases by 2.16 in monopolar group with 2.15 in bipolar group and this change is not significant in between monopolar and bipolar groups.

Post-operative complications like clot retention, TUR Syndrome and failure to void were reported after transurethral resection in monopolar group. In bipolar group there is no incidence of TUR syndrome which occurred in two the monopolar group .In postoperative complications there is no statistical difference between two groups.

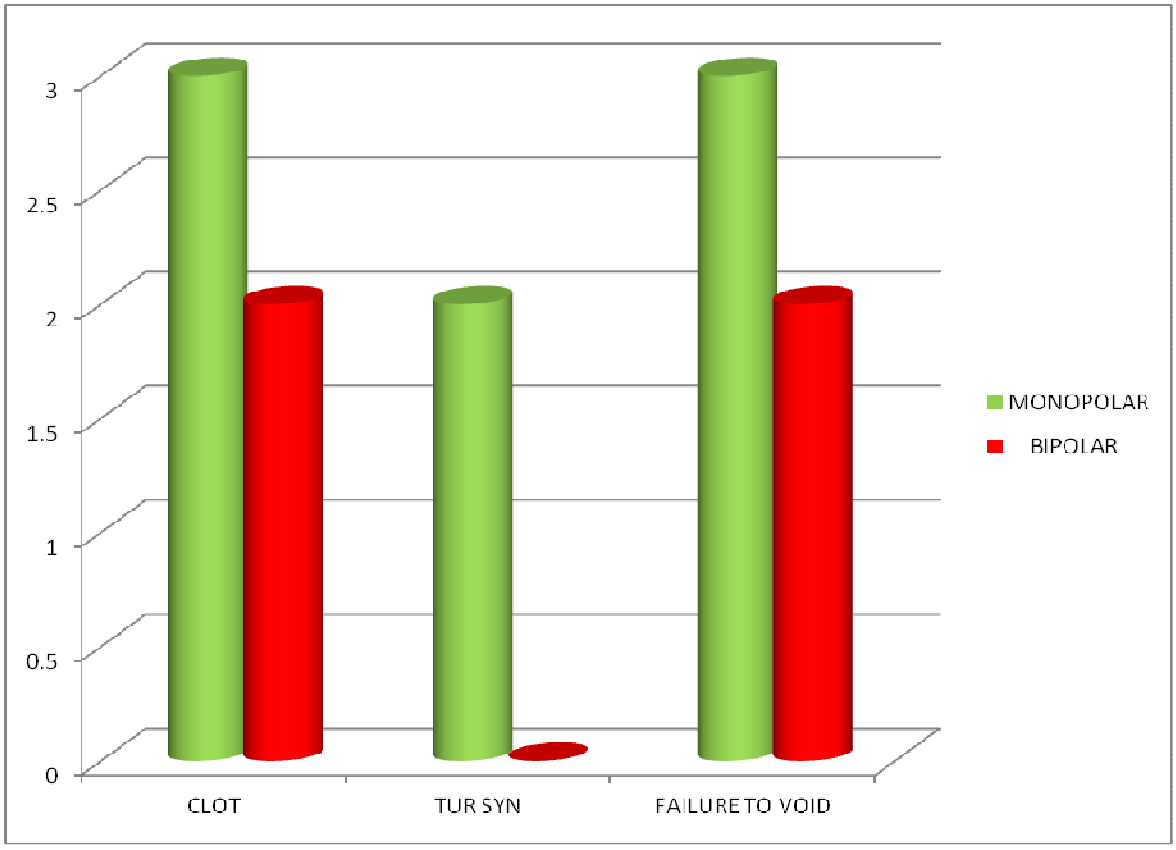


Figure 4. Postoperative complications - comparison

In monopolar group three patient developed clot retention and in bipolar group two patients developed clot retention which was treated with clot evacuation.

All postoperative catheters were removed on fourth postoperative day as per protocol and three patients in monopolar and two patients in bipolar group developed failure to void they were catheterised and started on medications.

When comparison of the results are done with in the groups all preoperative factors had significant changes both in monopolar and bipolar groups ($p<0.001$). IPSS, QOL, Qmax all parameters shown improvements.

Table 6 : T- TEST MONOPOLAR

		Mean	N	Std. Deviation	P value
Pair 1	QMAX - PRE	9.5766	64	1.01899	0.001
	QMAX - POST	17.7578	64	.74510	0.001
Pair 2	IPPS - PRE	23.17	75	1.996	0.001
	IPPS - POST	12.75	75	1.569	0.001
Pair 3	Hb - PRE	12.380	75	.8847	0.001
	Hb - POST	11.673	75	.8834	0.001
Pair 4	PCV - PRE	36.15	75	2.593	0.001
	PCV - POST	34.47	75	2.522	0.001
Pair 5	NA - PRE	139.60	75	2.922	0.001
	NA - POST	132.93	75	3.090	0.001
Pair 6	QOL - PRE	3.93	75	.723	0.001
	QOL - POST	1.87	75	.577	0.001

In analysing the results of both the groups, both the group had similar demographic data and in bipolar TURP resection time is slightly longer as compared to monopolar because of increased time taken for plasma bubble formation to be one of the factor or it may be due to learning curve related factor. In postoperative period both the group shown similar improvements in

IPSS ,QoL and Qmax. Fall in sodium ,haemoglobin and PCV occurs more with monopolar group and difference in sodium fall is important and two of the monopolar patients developed TUR Syndrome which was treated with iv fluids, hypertonic saline(3 %).

Table -7. T test bipolar

		Mean	N	Std. Deviation	P VALUE
Pair 1	QMAX - PRE	9.4841	63	1.18120	.001
	QMAX - POST	17.6349	63	.81244	.001
Pair 2	IPPS - PRE	22.84	75	1.779	.001
	IPPS - POST	12.96	75	1.528	.001
Pair 3	Hb - PRE	12.316	75	1.0925	.001
	Hb - POST	11.743	75	1.1035	.001
Pair 4	PCV - PRE	36.05	75	2.804	.001
	PCV - POST	34.35	75	3.069	.001
Pair 5	NA - PRE	139.52	75	3.073	.001
	NA - POST	135.29	75	3.200	.001
Pair 6	QOL - PRE	3.96	75	.761	.001
	QOL - POST	1.83	75	.554	.001

From the above study safety and equal efficacy of bipolar TURP was comparable with gold standard monopolar with added advantage of decreased incidence of TUR Syndrome .

DISCUSSION

Benign prostatic hyperplasia is one of the common old age problem in male population all over the world. Enlargement of prostate leads to development of variety of lower urinary tract symptoms(LUTS) like frequency, nocturia , thin stream, intermittency, urgency, incomplete emptying, straining etc. Enlargement of prostate usually starts around 40 to 50 years of age. By 80 to 85 years age about 90% of the people will develop symptoms related to benign prostatic hyperplasia. Lower urinary tract symptoms due to BPH are further divided into obstructive symptoms and irritative symptoms.

Complete history regarding symptomatology should be elicited and systematic examination of the patient done with specific importance given to genital and per rectal examination. After completing the basic workup specific importance given to uroflowmetry and Qmax recorded. Ultrasound KUB done and prostate volume measured. International prostatic symptom score (IPSS) [(20)] should be recorded along with quality of life index score (QoL)[(21)]. Depending on the IPSS patients are divided into having mild, moderate or severe symptoms and treated accordingly.

Treatment options for benign hyperplasia of prostate include watchful waiting, medical management and surgical management. Alpha blockers and 5 alpha reductase inhibitors can be given as medical management.[23] Surgical options varying from minimally invasive procedure to open prostatectomy depending on the patients need. Treatment is tailored according to patients symptoms and bothersome produced by enlargement of prostate and comorbid factors. In minimally invasive procedures transurethral resection of prostate (TURP) is considered as gold standard [33] and against this yardstick all other procedure are compared. Traditionally TURP is done with monopolar current in which current goes through the patient's body and reach the skin plate placed at contact point. Monopolar uses high energy. To overcome problems associated with monopolar TURP ,search was made for alternate treatment modality which leads to invention of bipolar TURP.

The basic difference in bipolar TURP is current pass through one stem and returned through another one without going through patients body and it utilises the lower voltages (220 – 320 Vrms).[34] Creation of plasma bubble at the resection site is basic principle behind the resection principle of bipolar TURP. Different type of bipolar loops are available in the market with the difference in returning pathway either with opposite stem or with the sheath.

Different type of bipolar working machines are available in the market which include 1) Gyrus plasma kinetic system or PK system. 2) TURIS system. 3) Bipolar vista CTR system, 4) Karl Storz system.

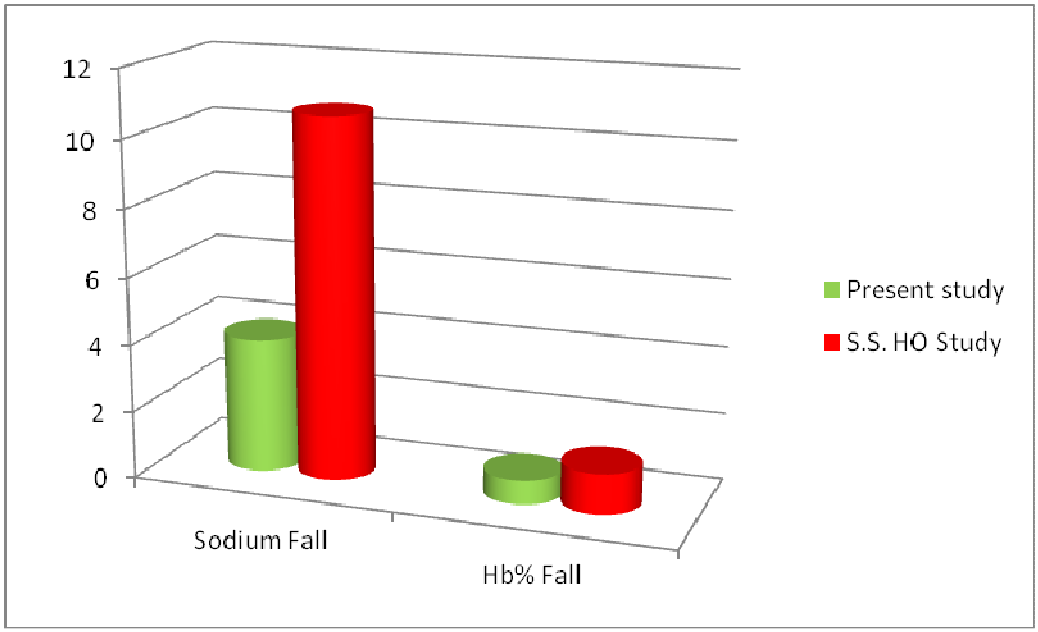
Botto et al first used saline in Gyrus device. It has ceramic insulation at tip. Later PK system was developed.

In our prospective study we used PK system for bipolar TURP. We randomized 150 patients and 75 patients were underwent bipolar TURP in saline. In present study demographic data were equal between monopolar and bipolar group. Resection time was more for the bipolar group as we used thick loop for resection and resection time found to be a statistically significant factor. Resection time was 42 minutes-+ 5.020 SD for monopolar group and 45.11+ 4.029 SD minutes in bipolar group. Regarding improvement in IPSS in monopolar group it is about 10.43 points+1.569 SD and in bipolar it is 9.88 + 1.528 SD at the end of one month. Qmax in monopolar group is 8.18 ml+.75 SD and in bipolar 8.15ml+.81 SD. Quality of life index also shown equal results between two groups.

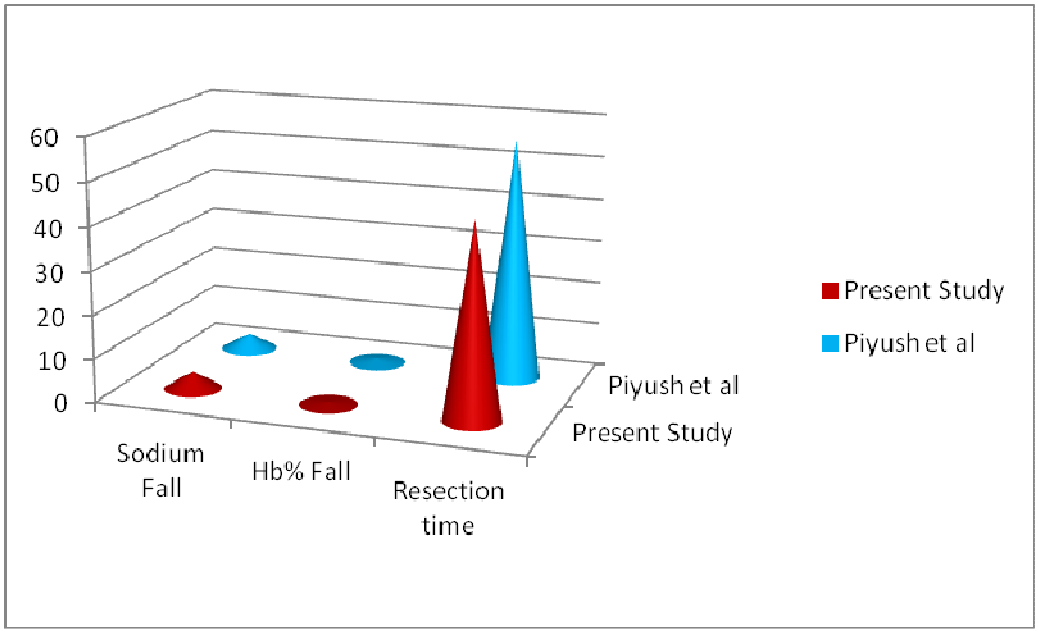
Fall in sodium is more with monopolar about 7 meq and it is 4 meq with bipolar. This is statistically significant (p=0.001). Transurethral syndrome developed in two of the monopolar group that was promptly recognized and treated. All other factors were equal between two groups.

Study *by Henry s.s.ho* et al [33] totally 100 patients were studied and fall in sodium level was more in monopolar group, about 10.7mmol higher than bipolar value of 3.2mmol. This was similar to our study but magnitude of sodium fall is more in comparison with our study. Resection time has not a significant factor in their study. Haemoglobin drop was about 1.2+ .6 grams% but in present study it was 0.71 grams and again magnitude of fall is more in ho"s study.

Study by *Singh H* et al [(35)] shown bipolar is equally effective as monopolar and monopolar group found to had more sodium drop (4.6 meq) which is similar to results of present study. Again resection time has not a significant factor in their study.



Study by *chang jun yoon* et al [36] shown, bipolar reduces the hospital stay and early catheter removal.



According to the study conducted at T.N.nair hospital, Bombay India by *Piyush et al* [37] difference in sodium fall is about 3 meq which is similar to present study. Haemoglobin fall in our study is .0.71gm% for monopolar and 0.58gm% for bipolar. *In Piyush* study it is about .97gm% and 0.55 gm %. Resection time is more in their study. Only 30 cases were studied in each group by *piyush* study compared to 75 cases each in present study.

Limitation and drawback of our study is small number of cases and short follow up period.

CONCLUSION

1. The present study shows bipolar is as equally effective as monopolar in reducing the IPSS.
2. Increase in the quality of life and maximal flow rate of bipolar TURP is equal to the results of monopolar TURP.
3. Our study shows that bipolar has less chance of hyponatremia hence TUR Syndrome as compared to monopolar.
4. Resection time for bipolar in our study is more, to compare with that of monopolar.

Bipolar TURP is as safe and equally effective as monopolar TURP but needs further large randomized trials to confirm the efficacy and safety

BIBILIOGRAPHY

1. Randall A. Surgical Pathology of Prostatic Obstruction, Baltimore, MD: Williams & Wilkins Co, 1931

2. Franks L: Benign prostatic hypertrophy: Gross and microscopic anatomy. U.S. Department of Health, Education, and Welfare NIH Publication No. 76-1113-63, 1976.

3. McNeal J: Pathology of benign prostatic hyperplasia: Insight into etiology. UrolClin North Am 1990; 17:477.

4. Lowsley OS. The development of the human prostate gland with reference to the development of other structures at the neck of the urinary bladder. Am J Anat 1912;13: 299-349.

5. Morgagni GB. The Seats and Causes of Disease Investigated by Anatomy, book 3, London: Johnson & Paine, 1760, p. 460.

6. Roehrborn CG. Pathology of benign prostatic hyperplasia. Int J Impot Res 2008;20[Suppl. 3]:S11–8.)

7. Chung LW, Cunha GR. Stromal-epithelial interactions: II. Regulation of prostatic growth by embryonic urogenital sinus mesenchyme. Prostate. 1983;4(5):503–511. doi: 10.1002/pros.2990040509.

8. Bierhoff E, Vogel J, Benz M, Giefer T, Wernert N, Pfeifer LL. Stromal nodules in benign prostatic hyperplasia. EurUrol 1996;29:345-54.

9. Isaacs JT: Antagonistic effect of androgen on prostatic cell death. Prostate 1984;5: 545-557

10. Chatterjee B: The role of the androgen receptor in the development of prostatic hyperplasia and prostate cancer. Mol Cell Biochem 2003; 253:89-101.

11. Naslund J, Coffey D: The differential effects of neonatal androgen, estrogen, and progesterone on adult prostate growth. J Urol 1986; 136:1136-1140.

12. Lee KL, Peehl DM: Molecular and cellular pathogenesis of benign prostatic hyperplasia. J Urol 2004; 172:1784-1791

13. McNeal J: Pathology of benign prostatic hyperplasia: Insight into etiology. UrolClin North Am 1990; 17:477.

14. Salm SN, Koikawa Y, Ogilvie V, et al: Transforming growth factor-beta is an autocrine mitogen for a novel androgen-responsive murine prostatic smooth muscle cell line, PSMC1. J Cell Physiol 2000; 185:416-424.

15. Partin JV, Anglin IE, Kyprianou N: Quinazoline-based alpha 1-adrenoceptor antagonists induce prostate cancer cell apoptosis via TGF-beta signalling and I kappa B alpha induction. Br J Cancer 2003; 88:1615-1621.

16. Lin VK, Benaim EA, McConnell JD: Alpha-blockade downregulates myosin heavy chain gene expression in human benign prostatic hyperplasia. Urology 2001; 57:170-175.

17. Hinman and Cox, 1967. Hinman F, Cox CE: Residual urine volume in normal male subjects. *J Urol* 1967; 97:641-645

18. McConnell JD, Barry MJ, Bruskewitz RC, et al: Benign Prostatic Hyperplasia: Diagnosis and Treatment. Clinical Practice Guideline. No. 8. (AHCPR publication No. 94-0582.) Rockville, Md, Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services, 1994

19. Schafer W, Rubben H, Noppeney R, Deutz FJ. Obstructed and unobstructed prostatic obstruction. A plea for urodynamic objectivation of bladder outflow obstruction in benign prostatic hyperplasia. World J Urol 1989;6:198

20. Barry MJ, Fowler FJ Jr., O"Leary MP, et al. The American Urological Association symptom index for benign prostatic hyperplasia. J Urol 1992;148:1549

21. Barry MJ. Evaluation of symptoms and quality of life in men with benign prostatic hyperplasia. Urology 2001;58(suppl 6a):25.

22. Barry MJ, Cockett ATK, Holtgrewe HL, et al. Relationship of symptoms of prostatism to commonly used physiologic and anatomical

measures of the severity of benign prostatic hyperplasia. J Urol 1993;150:351

23. Gormley GJ, Stoner E, Brusekewitz RC, et al: The effect of finasteride in men with benign prostatic hyperplasia. N Engl J Med 1992;327:1185-1191

24. Nesbit, 1943. Nesbit RM: *Transurethral Prostatectomy,* Springfield, Ill, Charles C Thomas, 1943

25. A Prospective Randomized Study Comparing Monopolar and Bipolar Transurethral Resection of Prostate Using Transurethral Resection in Saline (TURIS) System,Henry S.S. Ho, Sidney K.H. Yip, Kok B. Lim, Stephanie Fook, Keong T. Foo, Christopher W.S. Cheng ,*European Urology*, Volume 52, Issue 2, Pages 517-524

26. Theyer, G., G. Kramer, I. Assmann, E. Sherwood, W. Preinfalk, M. Marberger, O. Zechner, G. E. Steiner. 1992. Phenotypic characterization of infiltrating leukocytes in benign prostatic hyperplasia. Lab. Invest. 66: 96-107.

27. C.R. Chapple, A.J. Wein, P. Abrams, et al.. Lower urinary tract symptoms revisited: a broader clinical perspective. Eur Urol 54 (2008) (563 – 569)

28. Herr HW: Early history of endoscopic treatment of bladder tumors from Grunfeld's polypenkneipe to the Stern-McCarthy resectoscope. J Endourol 2006; **20:** 85.

29. McCarthy J: The management of prostatic obstructions by endoscopic revision. N Engl J Med 1932; **207:** 305.

30. Nesbit RM: A history of transurethral prostatectomy. Rev Mex Urol 1975; **35:** 349

31. Iglesias JJ, Sporer A, Gellman AC and Seebode JJ: New Iglesias resectoscope with continuous irrigation, simultaneous suction and low intravesical pressure. J Urol 1975; **114:**

32. Pu XY, Wang HP, Zeltser I, Pearle MS, Bagley DH.Saline is our friend.*Urology*2009;74: 28–9

33. Ho HSS, Yip SKH, Lim KB, Fook S, Foo KT, Cheng CWS. A prospective randomized study comparing monopolar and bipolar transurethral resection of prostate using transurethral resection in saline (TURIS) system. Eur Urol 2007;52:517–24.

34. Massarweh NN, Cosgriff N,Slakey DP. Electrosurgery: History, Principles, and Current and Future Uses. J Am Coll Surg 2006 ; 202:520-30

35. Singh H, Desai MR, Shrivastav P, Vani K. Bipolar versus monopolar transurethral resection of prostate: randomized controlled study. J Endourol 2005;19:333–8.

36. Transurethral Resection of the Prostate with a Bipolar Tissue Management System Compared to Conventional Monopolar

Resectoscope: One-Year Outcome ,Chang-Jun Yoon, Ji-Yoon Kim, Ki-Hak Moon, Hee-Chang Jung, and Tong-Choon Park Yonsei Med J. 2006 October 31; 47(5): 715–720.

37. Transurethral Resection of the Prostate ; A comparison ofsstandard monopolr versus bipolar saline resection,Piyush singhania,Dave nandini,Pathak,vol.36 (2) 183-189.International Braz J Urol.

38. Hahn R.G. Transurethral resection syndrome after transurethral resection of bladder tumours. Can J Anaesth 1995;42:69-72.

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr. M. Kanagasabapathi
PG in MCh Urology
Madras Medical College, Chennai -3

Dear Dr.M. Kanagasabapathi

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled "Comparison of outcomes of monopolar transurethral resection vs saline transurethral resection (bipolar) of prostate in patients with benign prostatic hypertrophy " No.13042012.

The following members of Ethics Committee were present in the meeting held on 19.04.2012 conducted at Madras Medical College, Chennai -3.

1.	Dr. S.K. Rajan. M.D.,FRCP.,DSc	-- Chairperson
2.	Prof. Pregna B. Dolia MD Director , Institute of Biochemistry, MMC, Ch-3	-- Member Secretary
3.	Prof. B. Kalaiselvi MD Prof. of Pharmacology ,MMC, Ch-3	-- Member
4.	Prof. C. Rajendiran, MD Director , Inst. of Internal Medicine, MMC, Ch-3	-- Member
5.	Prof. Md. Ali. MD.DM Prof & HOD, Dept. of MGE, MMC, Ch-3	-- Member
6.	Prof.P.Karkuzhali MD Director i/c, Prof., Inst. of Pathology, MMC, Ch-3	-- Member
7.	Prof. S. Deivanayagam MS Prof of Surgery, MMC, Ch-3	-- Member
8.	Prof. A. Radhakrishnan MD Prof of Internal Medicine, MMC, Ch-3	-- Member
9.	Thiru. S. Govindsamy. BABL	-- Lawyer
10.	Tmt. Arnold Soulina MA MSW	-- Social Scientist

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

Member Secretary, Ethics Committee

CONSENT FORM

Study Title

"COMPARISON OF OUTCOMES OF MONOPOLAR TRANSURETHRAL RESECTION VS SALINE TRANSURETHRAL RESECTION (BIPOLAR) OF PROSTATE IN PATIENTS WITH BENIGN PROSTATIC HYPERTROPHY"

I, _____ hereby give consent to participate in the study conducted by Dr.M.KANAGASABAPATHI, 2nd Year M.Ch (Urology) Postgraduate Student, Madras Medical College, and Rajiv Gandhi Government General Hospital, Chennai-3 and to use my personal clinical data and result of investigation for the purpose of analysis. I also give consent for further investigations.

Signature / Thumb Impression of the patient/ relative

Place

Date

Patient Name and Address

Signature of the Investigation

ஆராய்ச்சி ஒப்புதல் படிவம்

ஆராய்ச்சி தலைப்பு

"சுக்கிலச் சுரப்பி அதிவளர்ப்பிற்கு ஒரு வழி அல்லது இருவழி மின்சக்தி அறுவை சிகிச்சை முறையின் விளைவுகளை ஒப்பிடும் ஆய்வு"

ஆராய்ச்சி நிலையம் : சிறுநீரியல் துறை,
சென்னை மருத்துவக் கல்லூரி மற்றும்
ராஜீவ் காந்தி அரசு பொது மருத்துவமனை, சென்னை.

பங்கு பெறுவரின் பெயர் :

பாலினம் :

பங்குபெறபவரின் எண் :

பங்கு பெறுபவர் இதனை (✓) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் இவ்வாய்வில் தன்னிச்சையாகதான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக்கொள்ளவும் அதை பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கின்றேன். ☐

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன் இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிகிறேன். எனது உடல் நலம்பாதிக்கப்பட்டாலோ அல்லது எதிர்பாராத வழக்கதிற்கு மாறான நோய்க்குறி தென்பட்டாலோ உடனே அதை மருத்து அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன். ☐

இந்த ஆய்வில் எனக்கு இரத்தம், சிறுநீர், எக்ஸ்ரே, ஸ்கேன் மற்றும் தசை பரிசோதனை செய்துகொள்ள நான் முழு மனதுடன் சம்மதிக்கிறேன். ☐

பங்கேற்பவரின் கையொப்பம் ..... இடம்..... தேதி.....

கட்டைவிரல் ரேகை

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் .....

ஆய்வாளரின் கையொப்பம் ..... இடம்..... தேதி.....

ஆய்வாளரின் பெயர் .....

INFORMATION SHEET

- We are conducting a study of **"COMPARISON OF OUTCOMES OF MONOPOLAR TRANSURETHRAL RESECTION VS SALINE TRANSURETHRAL RESECTION (BIPOLAR) OF PROSTATE IN PATIENTS WITH BENIGN PROSTATIC HYPERTROPHY"** at Rajiv Gandhi Government General Hospital, Chennai- 600 003.

- The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

- Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.

- The results of the study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Signature of Investigator ***Signature of Participant***

Date:

தகவல் படிவம்

ஆய்வு செய்யப்படும் தலைப்பு

"சுக்கிலச் சுரப்பி அதிவளர்ப்பிற்கு ஒரு வழி அல்லது இருவழி மின்சக்தி அறுவை சிகிச்சை முறையின் விளைவுகளை ஒப்பிடும் ஆய்வு"

தங்களுடைய சுக்கில சுரப்பியின் அதிவளர்ப்பிற்கு ஒரு வழி அல்லது இருவழி மின்சக்தி அறுவை சிகிச்சை முறையின் மூலம் தங்களுக்கு அறுவை சிகிச்சை செய்யப்பட உள்ளது என்றும், இவ்விரு அறுவை சிகிச்சை முறைகளைப் பற்றியும் அதனால் ஏற்படும் விளைவுகளைப் பற்றியும் இவ்விருமுறைகளின் சிறப்பம்சங்களைப் பற்றியும் மருத்துவர் மூலம் அறிந்துகொண்டேன்.

இந்த ஆய்வில் பங்குபெறுவது நோயாளிகளின் சொந்த விருப்பத்திலேயே ஆகும். இந்ததாய்வையொட்டி எந்தவிதமான சந்தேகங்களுக்கும் விளக்கம் பெற நோயாளிகளுக்கு உரிமை உள்ளது. இந்த ஆய்வின் முடிவுகள் இறுதியில் பிரசுரிக்கப்படும்.

பங்கேற்பவரின் கையொப்பம் ..... இடம்..... தேதி.....

கட்டைவிரல் ரேகை

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் .....

ஆய்வாளரின் கையொப்பம் ..... இடம்..... தேதி.....

ஆய்வாளரின் பெயர் .....

PROFORMA

S.NO; IP NO:

NAME; UNIT:

AGE/ SEX: GROUP:

ADDRESS: PHONE NO:

HISTORY;

CLINICAL EXAMINATION: PR:

DIAGNOSIS: ON CATHETER:

INVESTIGATIONS:

PRE OP & POST OP:

CBC: *HB, PCV, TC, DC, ESR, PLATELETS, RBC*

RFT: *UREA, SUGAR, CREATININE, SODIUM, POTTASSIUM*

URINE: ALBUMIN, SUGAR, DEPOSITS,CULTURE & SENSITIVITY

X RAY & USG KUB; PR.VOLUME

UROFLOW: Q MAX

IPSS QUESTIONNAIRE WITH QOL

PROCEDURE:

INTRA OPERATIVE EVENTS

DURATION

POSTOPERATIVE PERIOD

POSTOP PERIOD:

FOLLOW UP:

International prostate symptom score (IPSS)

Name: Date:

	Not at all	Less than 1 time in 5	Less than half the	About half the time	More than half the	Almost always	**Your score**
Incomplete emptying Over the past month, how often have you had a sensation of not emptying your bladder completely after you finish urinating?	0	1	2	3	4	5	
Frequency Over the past month, how often have you had to urinate again less than two hours after you finished urinating?	0	1	2	3	4	5	
Intermittency Over the past month, how often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5	
Urgency Over the last month, how difficult have you found it to postpone urination?	0	1	2	3	4	5	
Weak stream Over the past month, how often have you had a weak urinary stream?	0	1	2	3	4	5	
Straining Over the past month, how often have you had to push or strain to begin urination?	0	1	2	3	4	5	

	None	1 time	2 times	3 times	4 times	5 times or more	**Your score**
Nocturia Over the past month, many times did you most typically get up to urinate from the time you went to bed until the time you got up in the morning?	0	1	2	3	4	5	

Total IPSS score	

Quality of life due to urinary symptoms	Delighted	Pleased	Mostly satisfied	Mixed – about equally satisfied and	Mostly dissatisfied	Unhappy	Terrible
If you were to spend the rest of your life with your urinary condition the way it is now, how would you feel about that?	0	1	2	3	4	5	6

Total score: 0-7 Mildly symptomatic; 8-19 moderately symptomatic; 20-35 severely symptomatic.

விடையளிக்க வேண்டிய வினாக்கள் :	இல்லவே யில்லை	5-யில் ஒரு தடவைக்கு குறைவாக	பாதி நேரத்துக்கும் குறைவாக	சுமார் பாதி நேரம்	பாதி நேரத்துக்கும் மேலாக	ஏறக்குறைய எப்போதும்	
1. கடந்த மாதத்தில் நீங்கள் சிறுநீர் கழிப்பதை முடித்தபிறகு சிறுநீரப்பையை முழுவதுமாகக் காலி செய்யவில்லை என்று எத்தனை முறை உணர்ந்திருக்கிறீர்கள்?	0	1	2	3	4	5	
2. கடந்த மாதத்தில் நீங்கள் சிறுநீர் கழித்து முடித்தபிறகு 2 மணி நேரத்துக்கும் குறைவாக மீண்டும் எத்தனை முறை சிறுநீர் கழிக்க நேரந்தது?	0	1	2	3	4	5	
3. கடந்த மாதத்தில் நீங்கள் சிறுநீர் கழித்தபோது எத்தனை முறை பாதியில் நிறுத்திப் பல தடவைகள் துவங்கியதாக உணர்ந்தீர்கள்?	0	1	2	3	4	5	
4. கடந்த மாதத்தில் சிறுநீர் கழிப்பதை ஒத்திப்போடுவது கிரமம் என்று எத்தனைமுறை உணர்ந்திருக்கிறீர்கள்?	0	1	2	3	4	5	
5. கடந்த மாதத்தில் எத்தனை முறை உங்களுக்குப் பலவீனமான சிறுநீரோட்டம் இருந்தது?	0	1	2	3	4	5	
6. கடந்த மாதத்தில் எத்தனை முறை நீங்கள் சிறுநீர் கழிக்கத் துவங்க முக்கவோ முனகவோ வேண்டியிருந்தது?	0	1	2	3	4	5	
	ஒன்று மில்லை	1 தடவை	2 தடவைகள்	3 தடவைகள்	4 தடவைகள்	5 அல்லது அதற்கு மேற்பட்ட தடவைகள்	
7. கடந்த மாதத்தில் நீங்கள் இரவில் படுக்கப்போன நேரத்திலிருந்து காலையில் நீங்கள் எழுந்திருந்த நேரம் வரை எத்தனை முறை பெரும்பாலும் சிறுநீர் கழிக்கவென்றே எழுந்திருந்தீர்கள்?	0	1	2	3	4	5	
					மொத்த மதிப்பெண்கள்		
	மகிழ்ச்சி	இதமான உணர்வு	பெரும்பாலும் திருப்தி	கலப்புணர்வு	பெரும்பாலும் அதிருப்தி	மகிழ்ச்சியின்மை	பயங்கரம்
சிறுநீர் சம்பந்தப்பட்ட அறிகுறிகளால் வாழ்க்கைத் தரத்தில் இப்போதுள்ள சிறுநீர் சம்பந்தப்பட்ட நிலையிலேயே நீங்கள் உங்கள் எஞ்சிய வாழ்க்கையைக் கழிக்க நேர்ந்தால் அதுபற்றி நீங்கள் என்ன உணர்வீர்கள்?	0	1	2	3	4	5	6

பதில்களுக்கு மதிப்பபெண்ணிடுதல்

1 முதல் 7 வரையான கேள்விகளுக்குரிய உங்கள் விடைகளிலிருந்து எண்களைக் கூட்டுங்கள். அதிகபட்ச இயன்ற மதிப்பெண் 35.

கடைசிக் கேள்வி உங்கள் அறிகுறிகள் பற்றி நீங்கள் எப்படி உணர்கிறீர்கள் என்பதை மதிப்பிட உங்களுக்கு உதவும்.

மதிப்பெண்கள் : 0-7 இலேசானது
8-18 நடுத்தரம்
> 18 கடுமை

குறிப்பு : இந்தச் சோதனை உங்கள் அறிகுறிகளின் கடுமையை அளப்பதற்கே. இது நோயறியும் ஒரு சோதனை அல்ல. வேறு வாச்த்தைகளில் சொன்னால், உங்களுக்கு BPH இருக்கிறதா இல்லையா என்று இது சொல்லாது. உங்கள் அறிகுறிகள் BPH-னால்தானா என்பதைத் தீர்மானக்க உங்கள் டாக்டரிடம் பேசுங்கள்.

இந்தத் தகவல் மருத்துவச் சிகிச்சைக்கு ஒரு மாற்று அல்ல.

பார்க்க : BPHக்கு அமெரிக்கன் யூரோலாஜிகல் அசோசியேஷன் (AUA) அறிகுறி அட்டவனை.

MASTER CHART – MONOPOLAR

S.NO	NAME	AGE	MO/BI	PREOPERATIVE						POSTOPERATIVE						PRE OP					PERI OP	POST OP OTHERS		
				Q MAX	IPPS	Hb	PCV	Na	QOL	Q MAX	IPPS	Hb	PCV	Na	QoL	VOL	CATH	DM	HT	DM+HT	OP TIME	CLOT	TURS	F T VOID
1	MANIKKAM	60	MONO	9.5	19	11.5	34	137	4	18.5	10	10.6	31	134	2	46	N	Y	N	N	54	N	N	N
2	AMARESAN	62	MONO	10.8	25	11.9	34	139	3	17.5	15	11.1	33	135	2	26	N	N	Y	N	35	N	N	N
3	PONNUSAMY	65	MONO	10	21	12	36	141	4	18.4	14	11.3	34	136	2	35	N	N	N	N	41	N	N	N
4	BALAN	73	MONO	NA	23	12.5	37	138	5	NA	13	11.9	35	132	2	29	Y	Y	N	N	35	N	N	N
5	ABDUL MAHAROOF	70	MONO	9.5	24	11.6	33	142	4	17.5	14	11	33	135	2	36	N	N	N	N	41	N	N	N
6	GOVINDASAMY	73	MONO	NA	26	12.5	34	141	5	NA	15	11.9	35	135	2	27	Y	N	N	N	35	N	N	N
7	SIVAPRAKASAM	80	MONO	10.5	24	10.2	30	137	4	17.6	14	9.5	28	131	1	32	N	N	N	N	39	N	N	N
8	MURUGESAN	65	MONO	8.4	21	11.6	33	140	4	17.1	11	11	33	135	2	36	N	Y	Y	Y	40	N	N	N
9	SHANMUGAM	70	MONO	11.1	23	11.5	34	136	3	18.8	12	11.2	33	132	1	28	N	N	N	N	37	N	N	N
10	MOHAMAD ALI	59	MONO	11.5	25	11.8	34	139	4	18.5	14	11	33	135	2	29	N	N	N	N	38	N	N	N
11	GAJINIKHAN	51	MONO	10.6	24	12.3	36	135	3	17.5	12	11.5	34	131	2	32	N	N	N	N	40	N	N	N
12	KRISHNAN	78	MONO	NA	22	11.9	35	140	6	NA	12	11	33	132	3	34	Y	N	N	N	42	N	N	N
13	SUBRAMANI	65	MONO	10.2	19	11.5	34	142	5	17.6	10	10.4	31	137	2	29	N	N	N	N	36	N	N	N
14	KASIPILLAI	70	MONO	9.5	24	12.6	37	146	4	18.4	12	11.5	34	140	2	31	N	N	N	N	40	N	N	N
15	THULUKKANAM	65	MONO	10.5	25	13.5	39	145	3	19.4	13	12.8	38	139	2	32	N	Y	Y	Y	42	N	N	N
16	MUTHUSAMY	73	MONO	10.8	26	12.5	36	138	3	17	13	11.9	35	132	2	39	N	N	N	N	45	N	N	N
17	KRISHNAPPAN	62	MONO	9.5	24	11.3	33	137	4	17.1	12	10.7	32	130	2	42	N	N	N	N	48	N	N	N
18	ANNAMALAI	65	MONO	11.2	26	11	33	135	4	16.6	15	10.4	31	129	2	29	N	N	N	N	37	N	N	N
19	ETHIYAPPAN	54	MONO	9.4	25	12.9	38	141	3	16.8	14	12.3	36	134	1	48	N	N	N	N	53	N	N	N
20	MANIKANDAN	76	MONO	NA	23	10.6	33	139	5	NA	12	10	30	133	2	32	Y	N	N	N	39	N	N	Y
21	ELUMALAI	72	MONO	11.2	27	11.8	34	144	4	18.5	14	11	33	135	1	34	N	N	N	N	40	N	N	N
22	ANTONY	73	MONO	10.2	24	11.6	33	135	3	17.6	13	11.1	33	129	1	27	N	Y	Y	Y	35	N	N	N
23	DHAKSHINAMOORTHI	60	MONO	9.2	24	12.9	37	139	5	18.6	13	12.1	36	123	2	50	N	N	N	N	55	N	Y	N
24	VENKATESAN	65	MONO	8.1	26	13.5	39	137	4	17.5	14	12.6	37	134	3	28	N	N	N	N	36	N	N	N
25	SARAVANAN	60	MONO	8.8	21	14.5	43	135	3	16.7	11	13.8	39	128	1	38	N	N	N	N	42	N	N	N

MASTER CHART – MONOPOLAR

S.NO	NAME	AGE	MO/BI	PREOPERATIVE						POSTOPERATIVE						PRE OP					PERI OP	POST OP OTHERS		
				Q MAX	IPPS	Hb	PCV	Na	QOL	Q MAX	IPPS	Hb	PCV	Na	QoL	VOL	CATH	DM	HT	DM+HT	OP TIME	CLOT	TURS	F T VOID
26	PARTHASARATHI	70	MONO	9.5	23	12.5	36	139	4	17.8	12	11.8	35	131	2	37	N	N	N	N	43	N	N	N
27	PANDI	69	MONO	10.5	24	13.5	39	140	3	19.2	12	12.8	37	133	2	38	N	Y	N	N	46	N	N	N
28	KULANTHIVELU	75	MONO	NA	20	13.5	39	145	5	NA	10	12.9	37	138	3	36	Y	N	N	N	42	N	N	N
29	PARTHASARATHI	60	MONO	9.1	23	13	39	142	4	18.5	12	12.5	36	135	2	41	N	N	Y	N	48	N	N	N
30	UTHARAPPAN	50	MONO	11	24	14.2	41	143	4	19.4	13	13.5	40	139	2	42	N	N	N	N	46	N	N	N
31	MUTHUSAMY	73	MONO	10.5	21	12.8	37	142	4	17.5	13	11.9	35	135	2	37	N	N	N	N	41	N	N	Y
32	ETHIRAJ	70	MONO	9.1	19	12.1	36	140	4	17.8	11	11.4	34	134	1	38	N	Y	Y	Y	43	Y	N	N
33	CHINNADURAI	65	MONO	7.5	25	11.9	34	135	3	17.1	14	11.2	33	128	1	29	N	N	N	N	37	N	N	N
34	MUNUSAMY	57	MONO	10.5	24	12.5	37	138	4	16.9	12	11.7	35	131	2	38	N	N	N	N	46	N	N	N
35	SUBRAYAN	65	MONO	9	22	12.4	36	137	5	18	11	11.6	35	131	2	29	N	Y	N	N	37	N	N	N
36	SUBRAMANI	65	MONO	9.5	26	12.8	37	140	3	17.5	15	12.2	36	134	2	39	N	N	N	N	45	N	N	N
37	SELVARAJ	60	MONO	8.6	25	13.2	39	139	4	16.5	14	12.5	37	132	2	45	N	N	N	N	48	N	N	N
38	NATARAJAN	70	MONO	NA	23	11.3	33	142	5	NA	13	10.5	31	135	2	30	Y	N	N	N	40	N	N	N
39	LAKSHMANAN	75	MONO	9	22	10.9	32	136	4	18.5	12	10.2	30	130	1	36	N	N	N	N	44	N	N	N
40	KANNAIYAN	65	MONO	10.2	21	11.8	35	141	4	17.6	13	11.3	30	134	2	27	N	Y	Y	Y	35	N	N	N
41	DEVENDRA RAO	67	MONO	7.5	22	12.1	36	138	3	17.5	11	11.5	33	132	1	41	N	N	N	N	48	N	N	N
42	VENKATESAN	65	MONO	9.2	23	12.6	37	139	4	17.6	12	11.8	35	133	2	27	N	N	N	N	35	N	N	N
43	SARAVANAN	60	MONO	11	25	13.1	39	137	4	17.1	15	12.4	36	132	3	43	N	N	N	N	50	N	N	N
44	MUNUSAMY	64	MONO	9.5	24	12.1	36	143	4	17.6	14	11.4	33	136	2	35	N	N	N	N	40	N	N	N
45	VELU	51	MONO	10.6	21	13.9	40	139	3	18.5	12	13.2	39	132	1	37	N	N	N	N	41	N	N	N
46	NARAYANAN	62	MONO	8.5	26	12.6	37	135	4	16.8	15	12	36	129	2	38	N	N	N	N	45	N	N	N
47	PACHAIYAPPAN	56	MONO	9.3	25	13.5	40	145	4	17.5	15	12.4	37	132	2	32	N	N	N	N	40	N	N	N
48	GIDDAMAI	59	MONO	10	21	13.9	40	144	3	17.2	12	13.1	39	136	1	38	N	N	Y	N	45	Y	N	N
49	THANGAVEL	60	MONO	9.8	19	12.4	36	136	3	17.5	10	11.8	35	130	2	28	N	N	N	N	36	N	N	N
50	ABDUL RASHID	59	MONO	9.5	23	13.5	39	140	4	17.6	12	12.9	38	135	1	36	N	Y	N	N	41	N	N	N

MASTER CHART – MONOPOLAR

S.NO	NAME	AGE	MO/BI	PREOPERATIVE						POSTOPERATIVE						PRE OP					PERI OP	POST OP OTHERS		
				Q MAX	IPPS	Hb	PCV	Na	QOL	Q MAX	IPPS	Hb	PCV	Na	QoL	VOL	CATH	DM	HT	DM+HT	OP TIME	CLOT	TURS	F T VOID
51	RAJAN	65	MONO	7.5	25	12.6	36	138	5	16.5	14	12	36	132	1	39	N	N	N	N	46	N	N	N
52	KESAVAN	58	MONO	9.5	25	12.9	38	142	4	17.6	14	12.2	36	135	2	40	N	N	N	N	45	N	N	N
53	SELVARAJ	70	MONO	NA	23	11.5	33	139	5	NA	11	10.8	32	132	3	27	Y	N	N	N	34	N	N	N
54	PERUMAL	80	MONO	NA	23	10.5	31	136	4	NA	12	9.8	29	130	3	35	Y	N	N	N	40	N	N	N
55	NATARAJAN	65	MONO	9.1	24	11.6	32	145	4	17.6	14	10.9	33	138	2	30	N	N	Y	N	38	Y	N	N
56	GOVINDASAMY	60	MONO	10.5	26	12.1	36	144	3	19.5	15	11.5	34	135	2	38	N	N	N	N	42	N	N	N
57	ADHIMOOLAM	51	MONO	10	25	13.1	39	143	4	17.6	15	12.6	38	138	2	37	N	Y	N	N	44	N	N	N
58	YESURATHINAM	65	MONO	9.5	22	11.2	33	139	4	18.4	10	10.6	32	132	2	30	N	N	N	N	37	N	N	N
59	ARUMUGAM	55	MONO	10.5	21	12.5	36	137	3	18.5	11	11.5	34	130	1	37	N	N	N	N	44	N	N	N
60	CHAKRAPANI	70	MONO	NA	23	11.9	35	142	5	NA	13	11.2	33	125	2	58	Y	N	Y	N	56	N	Y	N
61	RAMDOSS	54	MONO	7	21	13.5	40	136	4	16.9	11	12.8	38	130	2	38	N	N	N	N	44	N	N	N
62	ARULNATHAN	68	MONO	8.5	23	12.4	36	140	3	17.1	12	11.8	34	133	1	40	N	N	N	N	45	N	N	N
63	GNAPRAKASAM	54	MONO	9	22	13.4	39	138	4	16.5	11	12.7	38	131	2	30	N	N	N	N	40	N	N	N
64	DURAIRAJ	62	MONO	7.5	21	12.1	36	139	4	17.1	12	11.6	35	132	2	29	N	N	N	N	37	N	N	N
65	MUNUSAMY	70	MONO	NA	19	12.3	36	143	5	NA	10	11.6	34	135	3	27	Y	N	N	N	35	N	N	N
66	RAMASAMY	68	MONO	9.5	22	12.4	37	140	4	18.1	13	11.7	35	133	2	35	N	N	N	N	41	N	N	N
67	DURAISAMY	64	MONO	9.1	23	12.5	38	137	3	18.4	13	11.6	35	131	1	38	N	Y	Y	Y	42	N	N	N
68	SUBRAMANI	58	MONO	9.5	24	12.3	36	142	4	17.6	12	11.3	34	135	2	39	N	N	N	N	44	N	N	N
69	JANAKIRAMAN	63	MONO	9.1	22	12.6	36	136	3	17.4	11	11.8	35	130	1	36	N	N	N	N	42	N	N	N
70	AZEEZ	70	MONO	NA	23	11.3	33	141	5	NA	13	10.5	31	134	3	35	Y	N	N	N	42	N	N	Y
71	JEGANATHAN	57	MONO	9	25	12.9	37	143	4	17.5	15	12.1	36	136	2	41	N	N	N	N	47	N	N	N
72	GANESAN	68	MONO	8.5	21	11.5	33	138	5	18.5	12	10.9	32	131	2	38	N	Y	N	N	43	N	N	N
73	KASI	60	MONO	10.5	23	13.4	39	136	4	18.5	13	12.7	37	129	2	38	N	N	N	N	42	N	N	N
74	SAMPATH	60	MONO	9.2	23	12.9	38	142	4	18.4	15	12.3	37	136	2	34	N	N	Y	N	40	N	N	N
75	RAVI	52	MONO	10.5	27	13.5	39	141	3	18.4	17	12.9	35	134	2	48	N	N	N	N	52	N	N	N

MASTER CHART – BIPOLAR

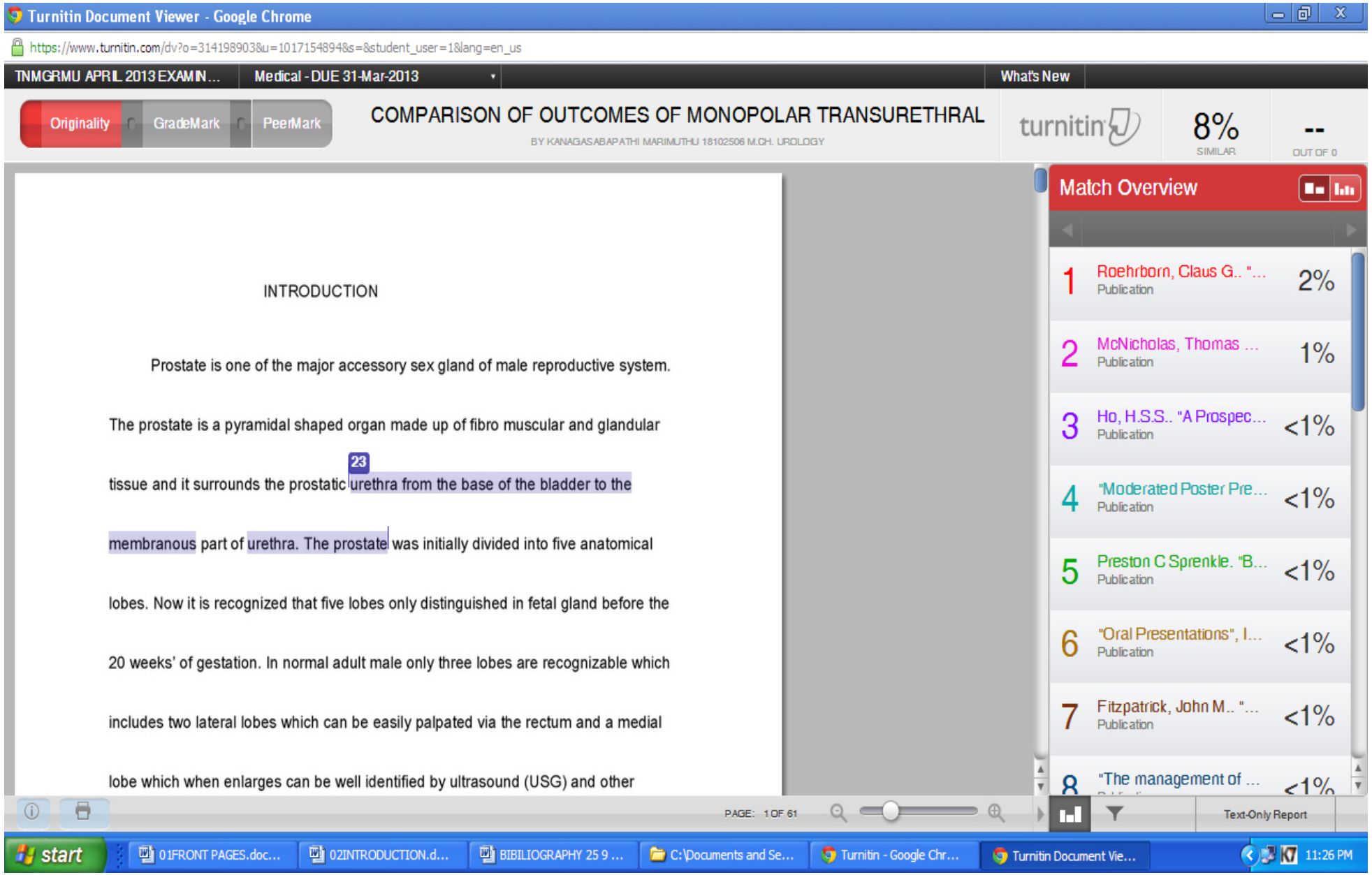
S.NO	NAME	AGE	MO/BI	PREOPERATIVE						POSTOPERATIVE						PRE OP					PERI OP	POST OP OTHERS		
				Q MAX	IPPS	Hb	PCV	Na	QOL	Q MAX	IPPS	Hb	PCV	Na	QoL	VOL	CATH	DM	HT	DM+HT	OP TIME	CLOT	TURS	F T VOID
1	AYYANAR	62	BI	8.3	21	11.5	34	135	4	18.8	14	11.1	33	131	2	28	N	Y	N	N	42	N	N	N
2	MOHAMAD ALI	67	BI	9.1	23	10.9	33	141	3	16.5	14	10.4	31	136	2	31	N	N	N	N	48	N	N	N
3	NAGAN	73	BI	10.9	20	12.8	38	137	4	18.2	13	12.2	35	132	3	33	N	N	N	N	49	N	N	N
4	ANNAMALAI	69	BI	7.2	23	11.5	34	138	4	17.1	14	10.9	32	133	2	36	N	Y	N	N	50	N	N	N
5	CHENGALVARAYAN	75	BI	11.1	24	12	36	139	3	18.1	14	11.3	33	135	2	27	N	N	Y	N	47	N	N	N
6	GANAPATHIRATHINAM	76	BI	10.9	21	11.7	34	140	4	17.5	13	11.2	33	135	2	41	N	N	N	N	48	N	N	N
7	KASI	70	BI	NA	22	10.5	32	143	5	NA	14	9.9	29	138	2	41	Y	N	N	N	50	Y	N	N
8	ELUMALAI	70	BI	10.1	21	12.7	37	140	4	18.6	15	11.9	35	135	3	36	N	Y	N	N	45	N	N	N
9	BALARAMAN	74	BI	8.3	21	10.5	31	134	4	17.1	12	9.9	29	130	2	43	Y	N	N	N	51	Y	Y	Y
10	POOMANIKKAM	65	BI	9.1	23	11.2	33	141	3	16.5	14	10.6	31	137	2	27	N	N	N	N	40	N	N	N
11	BALAI JOSEPH	61	BI	NA	20	11.5	34	139	5	NA	13	10.9	32	135	2	30	Y	N	N	N	43	N	N	N
12	CHINNAIH	70	BI	10.9	20	11.5	33	138	4	17.2	10	10.8	32	133	2	36	N	N	N	N	46	N	N	N
13	RAMACHANDRAN	56	BI	10.3	23	13.8	40	143	5	17.5	11	13.1	36	139	2	35	N	N	N	N	45	N	N	N
14	VENUGOPAL	60	BI	9.1	22	14.1	40	137	3	18.1	13	13.5	39	132	3	37	N	N	N	N	45	N	N	N
15	RAMAIH	72	BI	10.5	23	12.9	38	145	4	16.5	12	12.2	36	141	2	32	N	Y	Y	Y	44	N	N	N
16	NATESAN	70	BI	10.1	21	12.1	36	144	4	18.8	14	11.5	33	139	2	29	N	N	N	N	40	N	N	N
17	KRISHNAN	82	BI	NA	24	10.9	33	139	5	NA	15	10.3	30	135	2	36	Y	N	N	N	46	N	N	N
18	SELVARAJ	55	BI	9.3	21	11.8	34	142	4	17.2	12	11.1	33	138	2	27	N	N	N	N	36	N	N	N
19	MURUGESAN	60	BI	7.5	24	10.6	32	141	4	16.5	13	9.9	29	137	1	38	N	N	N	N	47	N	N	N
20	SHANMUGAM	75	BI	11.5	23	10.9	33	135	3	17.5	12	10.3	30	131	2	29	N	N	N	N	39	N	N	N
21	RANGARAJ	70	BI	10.1	24	10.2	31	134	3	17.6	13	9.6	28	130	2	36	N	N	N	N	46	N	N	N
22	KANNIYAPPAN	70	BI	9.2	25	11.7	34	141	5	16.7	14	11.1	32	137	1	38	N	Y	Y	Y	49	N	N	Y
23	PASUPATHI	77	BI	NA	24	12.1	36	145	4	NA	12	11.5	33	141	3	49	Y	N	N	N	52	N	N	N
24	KUPPUSAMY	83	BI	8	21	10.1	31	138	3	16.9	14	9.5	28	134	2	29	N	N	N	N	39	N	N	N
25	VELUSAMY	56	BI	10.5	22	14.5	41	137	4	18.5	13	13.8	39	129	2	52	N	N	N	N	57	N	N	N

MASTER CHART – BIPOLAR

S.NO	NAME	AGE	MO/BI	PREOPERATIVE						POSTOPERATIVE						PRE OP					PERI OP	POST OP OTHERS		
				Q MAX	IPPS	Hb	PCV	Na					Q MAX	IPPS	Hb	PCV	Na					Q MAX	IPPS	Hb
26	PALANI	67	BI	10.5	23	13.4	39	141	4	19	15	12.7	37	137	2	38	N	N	N	N	46	N	N	N
27	MANOKARAN	55	BI	9.2	24	14.4	40	142	5	17.6	12	13.8	39	138	1	36	N	Y	N	N	45	N	N	N
28	PRAKASAM	65	BI	8.2	20	12.4	37	136	4	17.5	11	12	35	131	2	39	N	N	N	N	46	N	N	N
29	PARI	57	BI	10	21	13.6	40	145	3	18	10	13.1	39	141	1	36	N	N	Y	N	45	N	N	N
30	VELAYUTHAM	56	BI	11.8	21	13.5	39	137	4	17.6	12	13	38	133	2	38	N	N	N	N	46	N	N	N
31	RAI	62	BI	9.3	19	12.4	36	139	3	17.1	10	11.9	35	134	1	37	N	N	N	N	44	N	N	N
32	SANTHAIAH	60	BI	7.8	25	12.9	38	135	4	16.2	13	12.4	36	131	2	29	N	Y	Y	Y	40	N	N	N
33	ARULAPPAN	70	BI	NA	22	12	36	146	6	NA	12	11.5	33	143	3	39	Y	N	N	N	47	N	N	N
34	SEBASTIN	52	BI	10	23	12.3	36	142	4	17.5	14	11.8	34	138	1	33	N	N	N	N	41	N	N	N
35	MUNUSAMY	55	BI	9.1	25	14	41	137	4	18.1	15	13.5	39	133	2	39	N	Y	N	N	47	N	N	N
36	KASI	60	BI	11.8	25	13.5	40	141	3	17.3	14	12.9	38	136	1	41	N	N	N	N	48	N	N	N
37	ETHIRAJ	70	BI	NA	23	11.8	34	137	6	NA	13	11.2	33	132	2	29	Y	N	N	N	40	N	N	N
38	MUNUSAMY	58	BI	10	22	12.8	37	142	4	16.9	13	12.5	37	137	2	28	N	N	N	N	39	N	N	N
39	RANGASAMY	65	BI	8.3	21	11.6	33	139	4	17	12	11.1	33	134	2	38	N	N	N	N	46	N	N	N
40	GULSAR	50	BI	9	21	13.7	40	135	3	18.2	13	13.4	39	131	1	41	N	Y	Y	Y	48	N	N	N
41	VEDI	57	BI	10.8	23	14	41	139	4	18.5	13	13.5	39	134	2	38	N	N		N	46	N	N	N
42	ETHIRAJ	60	BI	7.5	25	12.9	37	145	3	18.2	14	12.4	36	140	2	49	N	N	N	N	52	N	N	N
43	VELSAMY	56	BI	9.3	24	13.5	40	142	4	16.1	15	12.8	37	138	2	33	N	N	N	N	41	N	N	N
44	VEDI	51	BI	10	23	13.9	39	141	3	18.5	12	13.3	39	136	1	29	N	N	N	N	40	N	N	N
45	PERUMAL	65	BI	9.5	25	12.5	36	137	4	17.6	14	11.9	35	133	2	28	N	N	N	N	39	N	N	N
46	SUBBURAYAN	80	BI	NA	20	10.1	30	139	5	NA	10	9.5	28	136	1	33	Y	N	N	N	41	Y	N	N
47	ELUMALAI	70	BI	10.1	26	12.1	36	140	4	17.4	15	11.5	34	136	2	39	N	N	N	N	45	N	N	N
48	CHIINNA	65	BI	8.8	19	12.4	37	135	3	17.3	11	11.8	35	131	2	45	N	N	Y	N	50	N	N	N
49	MURUGAN	75	BI	NA	24	12.5	36	139	4	NA	12	11.9	35	135	2	37	Y	N	N	N	45	N	N	N
50	ANNAMALAI	78	BI	8.2	23	11.5	33	142	3	17.8	13	10.8	32	138	1	25	N	Y	N	N	35	N	N	N

MASTER CHART – BIPOLAR

S.NO	NAME	AGE	MO/BI	PREOPERATIVE						POSTOPERATIVE						PRE OP					PERI OP	POST OP OTHERS		
				Q MAX	IPPS	Hb	PCV	Na					Q MAX	IPPS	Hb	PCV	Na					Q MAX	IPPS	Hb
51	GOVINDASAMY	61	BI	10	25	11.9	35	145	4	18.5	15	11.3	33	141	1	35	N	N	N	N	42	N	N	N
52	MARIMUTHU	73	BI	10.5	23	12.5	37	144	4	19.6	14	11.9	34	140	2	41	N	N	N	N	48	N	N	N
53	CHINNAPPAN	74	BI	9.5	22	11.6	35	136	3	17.6	12	10.9	32	132	1	29	N	N	N	N	38	N	N	N
54	KOTHANDARAJ	65	BI	7.5	26	11.6	35	139	4	16.4	15	11.1	33	136	2	37	N	N	N	N	46	N	N	N
55	RAJI	59	BI	9.1	24	13.1	39	140	4	17.4	13	12.5	36	136	2	39	N	N	Y	N	46	N	N	N
56	ELLAPPAN	80	BI	NA	26	10.5	32	142	5	NA	17	9.9	28	138	2	34	Y	N	N	N	46	N	N	N
57	RAJARATHINAM	61	BI	10.1	27	11.1	33	141	4	17.6	16	10.5	31	138	2	31	N	Y	N	N	41	N	N	N
58	GOVINDASAMY	56	BI	10.5	25	12.6	36	137	4	18.6	14	12.1	36	133	2	35	N	N	N	N	46	N	N	N
59	THIRUMALAI	65	BI	9.5	23	12.5	36	136	4	18.1	12	12	35	132	2	29	N	N	N	N	38	N	N	N
60	GOPAL	70	BI	NA	24	12.5	37	139	5	NA	12	11.9	35	135	2	41	Y	N	Y	N	47	N	N	N
61	SUBRAMANI	65	BI	10.5	23	12.5	36	142	4	18.6	13	11.9	34	138	1	34	N	N	N	N	46	N	N	N
62	KANNADASAN	65	BI	9	24	12.6	36	140	3	17.8	14	12.1	36	136	1	29	N	N	N	N	39	N	N	N
63	KRISHNAN	65	BI	9.5	25	13.3	39	139	4	17.6	13	12.8	37	135	2	38	N	N	N	N	45	N	N	N
64	JEEVARATHINAM	82	BI	NA	25	11.2	33	135	5	NA	16	10.7	32	130	2	51	Y	N	N	N	55	N	N	N
65	MURUGAN	57	BI	10.5	24	13.5	39	142	4	19.6	13	12.9	38	138	2	41	N	N	N	N	49	N	N	N
66	GOVINDAPILLAI	70	BI	10.6	21	11.2	33	141	4	18.1	13	10.6	34	137	2	39	N	N	N	N	47	N	N	N
67	CHAKRAPANI	55	BI	9.1	21	12.2	36	138	4	17.9	10	11.7	35	134	2	38	N	Y	Y	Y	45	N	N	N
68	MARUTHAMUTHU	78	BI	10.8	23	13.5	39	135	3	18.6	11	12.9	38	131	1	35	N	N	N	N	43	N	N	N
69	RANGAN	68	BI	7.2	22	12.5	36	136	5	16.1	10	12.1	36	133	3	35	N	N	N	N	47	N	N	N
70	BALAJI	61	BI	8	23	11.6	33	142	3	16.5	13	11.1	33	138	2	36	N	N	N	N	45	N	N	N
71	VENKATESAN	70	BI	NA	23	12.9	37	144	6	NA	11	12.2	36	140	1	29	Y	N	N	N	38	Y	N	N
72	THANGAPANDI	55	BI	9.5	24	13.4	39	140	4	17.5	12	12.9	38	136	1	35	N	N	N	N	46	N	N	N
73	THULASINATHAN	77	BI	9.8	23	13.7	39	135	4	17.9	12	13	38	131	2	26	N	N	N	N	39	N	N	N
74	SHANMUGAM	74	BI	8.1	21	13.4	38	138	4	16.8	12	12.9	37	135	1	42	N	N	Y	N	47	N	N	N
75	SUBBURAJ	65	BI	7	23	12.6	37	139	3	17.4	13	12.1	35	135		37	N	N	N	N	44	N	N	N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INTRODUCTION
Prostate is one of the major accessory sex gland of male reproductive system.
The prostate is a pyramidal shaped organ made up of fibro muscular and glandular
tissue and it surrounds the prostatic urethra from the base of the bladder to the
membranous part of urethra. The prostate was initially divided into five anatomical
lobes. Now it is recognized that five lobes only distinguished in fetal gland before the
20 weeks' of gestation. In normal adult male only three lobes are recognizable which
includes two lateral lobes which can be easily palpated via the rectum and a medial
lobe which when enlarges can be well identified by ultrasound (USG) and other
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Assignment title	Medical
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INTRODUCTION Prostate is one of the major accessory sex gland of male reproductive system. The prostate is a pyramidal shaped organ made up of fibro muscular and glandular tissue and it surrounds the prostatic urethra from the base of the bladder to the membranous part of urethra. The prostate was initially divided into five anatomical lobes. Now it is recognized that five lobes only distinguished in fetal gland before the 20 weeks' of gestation. In normal adult male only three lobes are recognizable which includes two lateral lobes which can be easily palpated via the rectum and a medial lobe which when enlarges can be well identified by ultrasound (USG) and other imaging modalities....